

FINAL ENVIRONMENTAL IMPACT STATEMENT  
AND FINAL SECTION 4(F) AND 6(f) EVALUATIONS  
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

May 2011

SR 520, I-5 to Medina: Bridge Replacement and HOV Project

Air Quality Discipline Report  
Addendum and Errata



# **SR 520, I-5 to Medina: Bridge Replacement and HOV Project Final EIS**

## **Air Quality Discipline Report Addendum and Errata**



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## Attachments

- 1 Air Quality Discipline Report Errata
- 2 Construction Emissions, Vehicle and Fugitive Emissions, WASIST Intersection Data, and Construction Air Quality Effects Data



## List of Exhibits

- 1 Preferred Alternative Project Elements
- 2 Preferred Alternative and Comparison to SDEIS Options
- 3 Preferred Alternative Construction Stages and Durations
- 4 Summary of Applicable Ambient Air Quality Standards (Update to Exhibit 1 of the 2009 Discipline Report)
- 5 Intersections Evaluated for CO
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# Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	microgram(s) per cubic meter
AADT	average annual daily traffic
AWV	Alaskan Way Viaduct
BMP	best management practice
CEQ	Council on Environmental Quality
CO	carbon monoxide
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
HEI	The Health Effects Institute
HOV	high-occupancy vehicle
IRIS	the Integrated Risk Information System
MSAT	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
$\text{NO}_2$	nitrogen dioxide
$\text{NOx}$	oxides of nitrogen
$\text{O}_3$	ozone
PM	particulate matter
$\text{PM}_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
$\text{PM}_{10}$	particulate matter less than or equal to 10 microns in diameter
ppb	part(s) per billion
ppm	part(s) per million
PSRC	Puget Sound Regional Council
SCAQMD	South Coast Air Quality Management District
SDEIS	Supplemental Draft Environmental Impact Statement



SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SOx	sulfur oxides
VMT	vehicle mile traveled
VOC	volatile organic compound
WASIST	Washington State Intersections Screening Tool
WSDOT	Washington State Department of Transportation



# Introduction

## What is the purpose of this addendum?

This addendum to the SR 520, I-5 to Medina: Bridge Replacement and HOV Project SDEIS Air Quality Discipline Report (Washington State Department of Transportation [WSDOT] 2009a) presents the environmental consequences of the Preferred Alternative for the SR 520, I-5 to Medina: Bridge Replacement and HOV Project. This addendum compares its effects on Options A, K, and L discussed in the Supplemental Draft Environmental Impact Statement (SDEIS) for the project (WSDOT 2010). In addition, this addendum reflects additional analyses that resulted from the public and agency comments received on the SDEIS. These analyses are shown in the context of the Preferred Alternative. Note that greenhouse gas effects are discussed in the Energy Discipline Report Addendum (WSDOT 2011a).

The information contained in the 2009 Air Quality Discipline Report (WSDOT 2009a) on affected environment and project effects is still pertinent to the Preferred Alternative and its effects, except where this addendum specifically revises it. New text and exhibits updated to reflect the Preferred Alternative have been cross-referenced by page numbers and exhibit numbers to related text and exhibits contained within the 2009 Air Quality Discipline Report. Where an addendum exhibit updates or adds new data and/or different potential effects on an exhibit contained in the 2009 Air Quality Discipline Report, the exhibit name is followed by "(update to Exhibit ## of the 2009 discipline report)." The errata to the 2009 Air Quality Discipline Report is included as a table in Attachment 1.

New information used in the description of the affected environment includes discussion of updated National Ambient Air Quality Standards (NAAQS).

Project design and construction information used to analyze potential effects of the Preferred Alternative on air quality is included in the Description of Alternatives Discipline Report Addendum (WSDOT 2011b) and Construction Techniques and Activities Discipline Report Addendum and Errata (WSDOT 2011c).

## What key issues were identified in the public and agency comments on the SDEIS and are addressed in this addendum?

Key air quality concerns identified in public comments were as follows:

- Requests for a quantitative analysis of mobile source air toxics (MSAT) during project operation, according to current Federal Highway Administration (FHWA) interim guidance (FHWA 2009)
- Requests for quantitative estimates of construction-related emissions of criteria air pollutants



- Concerns regarding air quality at vents and portals of the proposed Montlake lid
- Requests for additional information on the health effects of expected emissions associated with the project

## What are the key points of this addendum?

The primary effects of the Preferred Alternative on air quality are summarized in the bullets below. In general, many of the effects would be similar to those of Option A except for the differences shown in bold below.

- Under the No Build Alternative and Preferred Alternative, traffic using SR 520 would have no noticeable effect on air quality in the region or locally.
- Construction activities from implementing the Preferred Alternative would generate dust and fumes in the immediate vicinity of the activity during the duration of construction.
- The air quality analysts evaluated the operational effects of the project by performing modeling of emissions from motor vehicles, both regionally and at specific intersections. Regional emissions estimates were performed for the years 2030 and 2040 using the U.S. Environmental Protection Agency (EPA) -approved MOBILE6 model (EPA 2002). Local intersection hotspot modeling was performed using the Washington State Intersections Screening Tool (WASIST) for the years 2018, 2030, and 2040. The results of the modeling indicated that the Preferred Alternative would not violate ambient air quality standards.
- The report presents the following key findings that resulted from the air quality analysis:
  - The project is not expected to cause or contribute to any new violation of the NAAQS.
  - The project is expected to have a higher potential for MSAT emissions. Estimates of MSAT emissions along the SR 520 corridor are provided.
  - The project meets air quality conformity requirements.

## What is the SR 520, I-5 to Medina: Bridge Replacement and HOV Project?

The SR 520, I-5 to Medina: Bridge Replacement and HOV Project would widen the SR 520 corridor to six lanes from I-5 in Seattle to Evergreen Point Road in Medina, and would restripe and reconfigure the lanes in the corridor from Evergreen Point Road to 92nd Avenue NE in Yarrow Point. It would replace the vulnerable Evergreen Point Bridge (including the west and east approach structures) and Portage Bay Bridge, as well as the existing local street bridges across SR 520. The project would complete the regional high-occupancy vehicle (HOV) lane system across SR 520, as called for in regional and local transportation plans.



## What is the Preferred Alternative?

The new SR 520 corridor would be six lanes wide (two 11-foot-wide outer general-purpose lanes and one 12-foot-wide inside HOV lane in each direction), with 4-foot-wide inside shoulders and 10-foot-wide outside shoulders across the floating bridge. The typical roadway cross-section across the floating bridge would be 116 feet wide, compared to the existing width of 60 feet. In response to community interests expressed during public review of the January 2010 SDEIS, the SR 520 corridor between I-5 and the Montlake interchange would operate as a boulevard or parkway with a posted speed limit of 45 miles per hour and median planting across the Portage Bay Bridge. To support the boulevard concept, the width of the inside shoulders in this section of SR 520 would be narrowed from 4 feet to 2 feet, and the width of the outside shoulders would be reduced from 10 feet to 8 feet. Exhibit 1 highlights the major components of the Preferred Alternative.

The Preferred Alternative would include the following elements:

- An enhanced bicycle/pedestrian crossing adjacent to the East Roanoke Street bridge over I-5
- Reversible transit/HOV ramp to the I-5 express lanes, southbound in the morning and northbound in the evening
- New undercrossings and an integrated lid at 10th Avenue East and Delmar Drive East
- A six-lane Portage Bay Bridge with a 14-foot-wide westbound managed shoulder that would be used as an auxiliary lane during peak commute hours
- An improved urban interchange at Montlake Boulevard integrated with a 1,400-foot-long lid configured for transit, pedestrian, and community connectivity
- A new bascule bridge across the Montlake Cut that provides additional capacity for transit/HOV, bicycles, and pedestrians
- Improved bridge clearance over Foster Island and the Arboretum Waterfront Trail
- A new west approach bridge configured to be compatible with future high-capacity transit (including light rail)
- A new floating bridge with two general-purpose lanes, and one HOV lane in each direction
- A new 14-foot-wide bicycle/pedestrian path with scenic pull-outs along the north side of the new Evergreen Point Bridge (west approach, floating span, and east approach), connecting regional trails on both sides of Lake Washington
- A new bridge maintenance facility and dock located underneath the east approach of the Evergreen Point Bridge
- Re-striped and reconfigured roadway between the east approach and 92nd Avenue NE, tying in to improvements made by the SR 520, Medina to SR 202: Eastside Transit and HOV Project



- Design features that would also provide noise reduction including reduced speed limit on Portage Bay Bridge, 4-foot concrete traffic barriers, and noise absorptive materials applied to the inside of the 4-foot traffic barriers and lid portals. Quieter concrete pavement would also be used for the new SR 520 main line, and noise walls where recommended by the noise analysis and approved by affected property owners would be included in the design
- Basic and enhanced stormwater treatment facilities

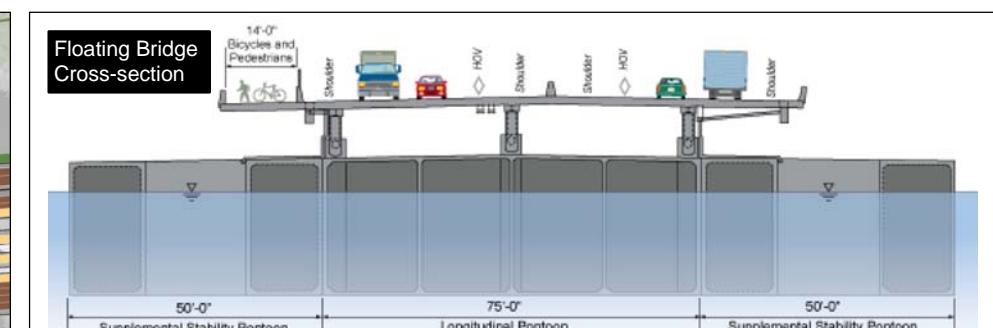
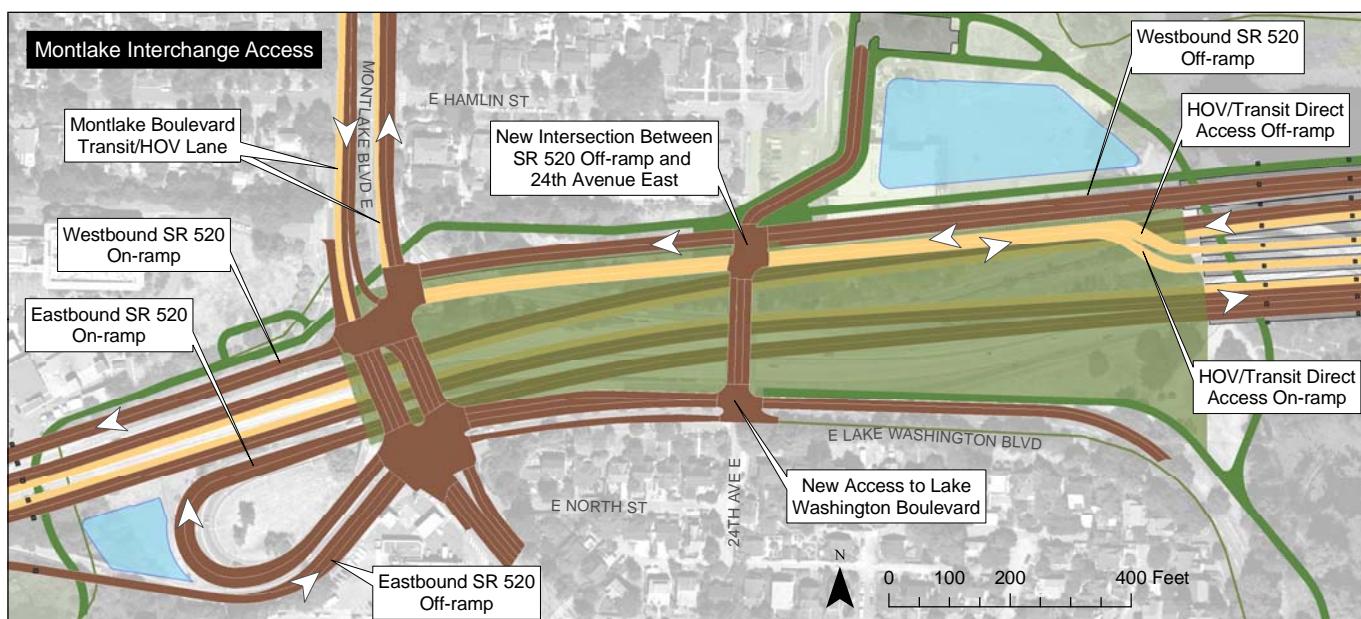
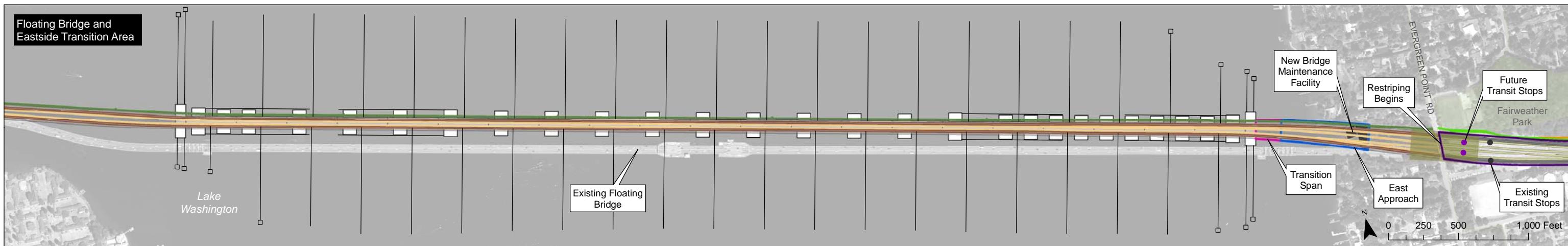
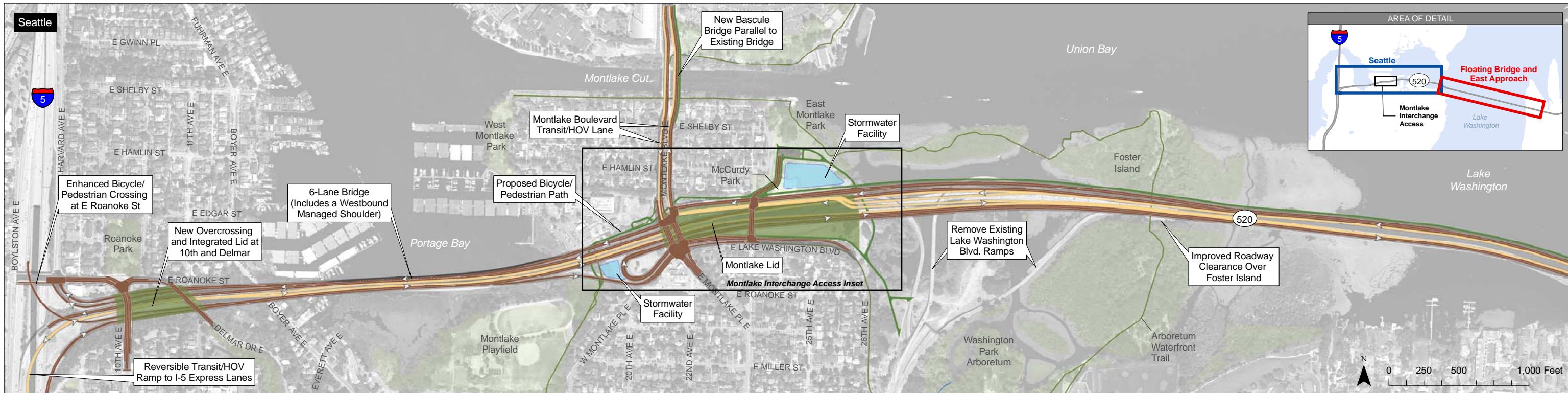
Exhibit 2 summarizes the Preferred Alternative design compared to the existing corridor elements, and compares the Preferred Alternative to design options A, K, and L. For a more detailed description of the Preferred Alternative, see the Description of Alternatives Discipline Report Addendum (WSDOT 2011b).

## When will the project be built?

Construction for the SR 520, I-5 to Medina project is planned to begin in 2012, after project permits and approvals are received. To maintain traffic flow in the corridor, the project would be built in stages. Major construction in the corridor is expected to be complete in 2018. The most vulnerable structures (the Evergreen Point Bridge including the west and east approaches, and Portage Bay Bridge) would be built in the first stages of construction, followed by the less vulnerable components (Montlake and I-5 interchanges). Exhibit 3 provides an overview of the anticipated construction stages and durations identified for the SR 520, I-5 to Medina project.

A Phased Implementation scenario was discussed in the SDEIS as a possible delivery strategy to complete the SR 520, I-5 to Medina project in phases over an extended period. FHWA and WSDOT continue to evaluate the possibility of phased construction of the corridor should full project funding not be available by 2012. Current committed funding is sufficient to construct the floating portion of the Evergreen Point Bridge, as well as the new east approach and a connection to the existing west approach. The Final EIS discusses the potential for the floating bridge and these east and west “landings” to be built as the first phase of the SR 520, I-5 to Medina project. This differs from the SDEIS Phased Implementation scenario, which included the west approach and the Portage Bay Bridge in the first construction phase. Chapters 5.15 and 6.16 of the Final EIS summarize the effects for this construction phase. Therefore, this discipline report addendum addresses only the effects anticipated as a result of the updated construction schedule.





#### I-5 to Medina Project Elements

- Column
- Anchor and Cable
- Existing Regional Bicycle/Pedestrian Path
- General-Purpose Lane
- HOV, Direct Access, and/or Transit-Only Lane
- Westbound Managed Shoulder
- Proposed Bicycle/Pedestrian Path

- East Approach
- Transition Span
- Restriping Area
- Stormwater Treatment Facility
- Lid
- Pontoon

#### Medina to SR 202 Project Elements

- General-Purpose Lane
- HOV Lane
- Bike Path
- Points Loop Trail
- Medina to SR 202 Project Lid

Source: King County (2006) Aerial Photo, King County (2008) GIS Data (Stream), CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.



#### Exhibit 1. Preferred Alternative Project Elements

I-5 to Medina: Bridge Replacement and HOV Project



## Exhibit 2. Preferred Alternative and Comparison to SDEIS Options

Geographic Area	Preferred Alternative	Comparison to SDEIS Options A, K, and L
I-5/Roanoke Area	The SR 520 and I-5 interchange ramps would be reconstructed with generally the same ramp configuration as the ramps for the existing interchange. A new reversible transit/HOV ramp would connect with the I-5 express lanes.	Similar to all options presented in the SDEIS. Instead of a lid over I-5 at Roanoke Street, the Preferred Alternative would include an enhanced bicycle/pedestrian path adjacent to the existing Roanoke Street Bridge.
Portage Bay Area	The Portage Bay Bridge would be replaced with a wider and, in some locations, higher structure with six travel lanes and a 14-foot-wide westbound managed shoulder.	Similar in width to Options K and L, similar in operation to Option A. Shoulders are narrower than described in SDEIS (2-foot-wide inside shoulders, 8-foot-wide outside shoulder on eastbound lanes), posted speed would be reduced to 45 mph, and median plantings would be provided to create a boulevard-like design.
Montlake Area	The Montlake interchange would remain in a similar location as today. A new bascule bridge would be constructed over the Montlake Cut. A 1,400-foot-long lid would be constructed between Montlake Boulevard and the Lake Washington shoreline. The bridge would include direct-access ramps to and from the Eastside. Access would be provided to Lake Washington Boulevard via a new intersection at 24th Avenue East.	Interchange location similar to Option A. Lid would be approximately 75 feet longer than previously described for Option A, and would be a complete lid over top of the SR 520 main line, which would require ventilation and other fire, life, and safety systems. Transit connections would be provided on the lid to facilitate access between neighborhoods and the Eastside. Montlake Boulevard would be restriped for two general-purpose lanes and one HOV lane in each direction between SR 520 and the Montlake Cut.
West Approach Area	The west approach bridge would be replaced with wider and higher structures, maintaining a constant profile rising from the shoreline at Montlake out to the west transition span. Bridge structures would be compatible with potential future light rail through the corridor.	Bridge profile most similar to Option L, and slightly steeper; structure types similar to Options A and L. The gap between the eastbound and westbound structures would be wider than previously described to accommodate light rail in the future.
Floating Bridge Area	A new floating span would be located approximately 190 feet north of the existing bridge at the west end and 160 feet north of the existing bridge at the east end. The floating bridge would be approximately 20 feet above the water surface at the midspan (about 10 to 12 feet higher than the existing bridge deck).	Similar to design described in the SDEIS. The bridge would be approximately 10 feet lower than described in the SDEIS, and most of the roadway deck support would be constructed of steel trusses instead of concrete columns.
Eastside Transition Area	A new east approach to the floating bridge, and a new SR 520 roadway would be constructed between the floating bridge and Evergreen Point Road.	Same as described in the SDEIS.



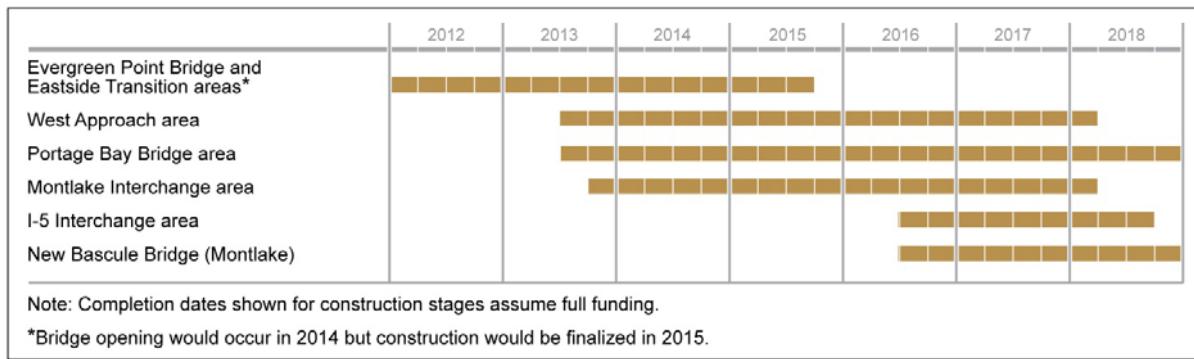


Exhibit 3. Preferred Alternative Construction Stages and Durations

## Are pontoons being constructed as part of this project?

WSDOT has completed planning and permitting for a new facility that will build and store the 33 pontoons needed to replace the existing capacity of the floating portion of the Evergreen Point Bridge in the event of a catastrophic failure. If the bridge does not fail before its planned replacement, WSDOT would use the 33 pontoons constructed and stored as part of the SR 520 Pontoon Construction Project in the SR 520, I-5 to Medina project. An additional 44 pontoons would be needed to complete the new 6-lane floating bridge planned for the SR 520, I-5 to Medina project. The additional pontoons would be constructed at Concrete Technology Corporation in the Port of Tacoma, and if available, at the new pontoon construction facility located on the shores of Grays Harbor in Aberdeen, Washington. Final pontoon construction locations will be identified at the discretion of the contractor. For additional information about project construction schedules and pontoon construction, launch, and transport, please see the Construction Techniques and Activities Discipline Report Addendum and Errata (WSDOT 2011c).

## Affected Environment

### What were the updates to the affected environment?

There were no updates to the affected environment for air quality since preparation of the SDEIS analysis. Pages 15 through 22 of the 2009 Air Quality Discipline Report describe the affected environment (WSDOT 2009a).

### What standards apply to air quality?

Since the Air Quality Discipline Report was written, there have been some changes to the NAAQS. On April 12, 2010, a new 1-hour NAAQS for nitrogen dioxide ( $\text{NO}_2$ ) became effective. On August 23, 2010, a new 1-hour sulfur dioxide ( $\text{SO}_2$ ) NAAQS became effective, and the existing 24-hour and



annual SO<sub>2</sub> standards were revoked. A complete NAAQS table with the current standards is included as Exhibit 4. The NAAQS are equal to or stricter than the Washington standards, so only the NAAQS values are included in the table.

**Exhibit 4. Summary of Applicable Ambient Air Quality Standards (Update to Exhibit 1 of the 2009 Discipline Report)**

Pollutant	Standard	Averaging Period
Nitrogen dioxide	100 ppb	1 hour
	0.053 ppm	annual
Carbon monoxide	9 ppm	8 hours
	35 ppm	1 hour
Ozone	0.075 ppm	8 hours
Lead	1.5 µg/m <sup>3</sup>	quarterly
Sulfur dioxide	0.05 ppm	3 hours
	75 ppb	1 hour
Particulate matter (PM <sub>10</sub> )	150 µg/m <sup>3</sup>	24 hours
Particulate matter (PM <sub>2.5</sub> )	15 µg/m <sup>3</sup>	annual
	35 µg/m <sup>3</sup>	24 hours

Source: EPA 2010a (40 Code of Federal Regulations [CFR] 50)

Note: Carbon dioxide (CO<sub>2</sub>) is not currently subject to federal or state ambient air quality standards.

µg/m<sup>3</sup> = microgram(s) per cubic meter

PM<sub>10</sub> = particulate matter less than or equal to 10 microns in diameter

PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter

ppb = part(s) per billion

ppm = part(s) per million

## Potential Effects

The 2009 Air Quality Discipline Report provides a detailed discussion of effects of the No Build Alternative and Options A, K, and L (WSDOT 2009a, pages 23 through 32). The discussion below supplements the 2009 Air Quality Discipline Report and compares the effects of the Preferred Alternative with the No Build Alternative and Options A, K, and L using new text and new or updated exhibits where appropriate. This Addendum provides an updated analysis of the No Build Alternative because of updated assumptions about the baseline transportation network.



# **What were the methods used to evaluate the potential effects and how have they changed since publication of the SDEIS?**

## **Construction**

The SDEIS included a qualitative discussion of construction effects. Common sources of construction emissions as well as the associated pollutants of concern are described in the Air Quality Discipline Report (WSDOT 2009a) for Options A, K, and L and the No Build Alternative. Estimated construction schedules for the Preferred Alternative, based on an updated evaluation of construction timing, indicate that construction is anticipated to exceed 5 years. As required by the transportation conformity rule (40 CFR 93), construction for this length of time (longer than 5 years) triggers the need for a quantitative construction analysis of pollutants for which the area has been designated as nonattainment or maintenance. This addendum includes the quantitative estimate of air quality effects during construction of the Preferred Alternative for the two areas where emissions would occur for longer than 5 years -- the west approach area and the Portage Bay Bridge area, seen in Exhibit 1. In addition, this addendum provides quantitative estimate of air quality effects for other project construction areas, including Evergreen Point Bridge and Eastside Transition areas, Montlake Interchange area, I-5 Interchange area, and the new bascule bridge, where construction would last fewer than 5 years. Although quantitative evaluation of these areas is not required, WSDOT is providing the information in response to public comments received on the SDEIS. The project is located in an area designated as maintenance for carbon monoxide (CO) and attainment for all other pollutants; however, WSDOT is providing emissions estimates for all criteria pollutants.

## **Quantitative Construction Analysis**

The air quality analyst estimated: emissions of criteria pollutants from construction equipment, including vehicles likely to be used for on-road hauling; fugitive dust from site grading and demolition activities; emissions associated with asphalt paving; and vehicle emissions associated with construction worker commutes. The analyst estimated total emissions for each year of construction at all of the six locations listed in Exhibit 3. Although the results of this analysis are reported for a total of five locations (the Montlake Interchange area was assumed to include the bascule bridge area, as well as the Evergreen Point Bridge and Eastside Transition areas for purposes of this analysis).

The analysis was based on the Final EIS transportation findings for the SR 520 I-5 to Medina project and information on likely construction timing and methods identified by WSDOT and the findings of the analysis are contained in Attachment 2 to this Addendum.

During project construction, onsite operation of heavy-duty construction equipment would generate exhaust emissions containing pollutants such as CO, ozone (NO<sub>x</sub>), volatile organic compounds (VOCs), SO<sub>2</sub>, particulate matter less than or equal to 10 microns in diameter (PM<sub>10</sub>), and particulate matter less than or equal to 2.5 microns in diameter (PM<sub>2.5</sub>). Earth-moving activities would generate



emissions of PM<sub>10</sub> and PM<sub>2.5</sub> as fugitive dust. Offsite vehicle trips made by employees and supply trucks to and from the sites would generate additional vehicle exhaust emissions. Asphalt paving would be a source of VOC emissions. Construction emissions were quantified for each construction year of 2012 through the opening year of the project, anticipated to be 2018, for the Preferred Alternative based upon information provided by the project's construction and transportation teams.

The exact schedule of specific activities cannot be estimated at this time. The schedule will be developed once a construction contractor has been selected. Throughout the construction duration, the type and intensity of activities will vary. The emissions calculations do not capture daily peaks or lulls in activity, but annual totals represent all expected activities. Activities would also vary by year, which is also not detailed in the emissions estimates. By distributing the total construction activities over the entire duration, it is assumed that any yearly variations are evened out by overestimating some equipment use while underestimating other equipment use.

There are no state or local guidelines for evaluating the degree of impact from construction pollutant emissions. The result tables for the analysis show the relative emissions for each construction area, identify the area with the potential for the greatest emissions, and demonstrate the temporary nature of construction related pollutant emissions. Assumptions for each emissions type for various construction activities are included in the following sections.

## **Particulate Matter**

PM<sub>10</sub> and PM<sub>2.5</sub> emissions were calculated following the methodology recommended by South Coast Air Quality Management District (SCAQMD). Particulate matter emission sources are primarily associated with soil disturbance and include, but are not limited to, the following:

- Demolition
- Excavation
- Grading
- Material handling
- Paved and unpaved road-entrained dusts
- Stockpiling

Fugitive dust is particulate matter that is suspended in the air by wind or human activities. WSDOT projects that require earthwork or otherwise have the potential to create fugitive dust are required to employ best management practices (BMPs) to control dust at WSDOT project sites.

Fugitive dust emissions that would be caused by surface disturbance within the construction site were estimated using an uncontrolled PM<sub>10</sub> emission factor of 20 pounds per acre per day. This factor is consistent with model inputs recommended in the California Air Resources Board's URBEMIS2007 model. It was assumed that the disturbed areas would be watered at least twice a day, which would reduce fugitive dust emissions from the construction sites by 50 percent. The maximum disturbed area was assumed to be 0.2 to 8 acres per day, depending on location, throughout the entire construction period. PM<sub>2.5</sub> emissions were assumed to be 21 percent of PM<sub>10</sub> emissions, using the PM<sub>2.5</sub> fraction recommended by SCAQMD (SCAQMD 2006).

The estimates of fugitive dust emissions were extremely conservative, and likely overestimated the probable annual PM<sub>10</sub> and PM<sub>2.5</sub> emissions. Without the specific details of daily construction



activities available, the calculations assumed that site grading would occur during every day of construction activity.

## **Vehicle and Equipment Exhaust**

Off-road construction equipment emission factors of CO, NOx, VOCs, sulfur oxide (Sox), PM<sub>10</sub>, and PM<sub>2.5</sub> were calculated using the EPA NONROAD program. NONROAD2008a is an EPA model designed to predict emissions from various nonroad equipment categories. Pollutant emissions were calculated based on equipment horsepower, hours of operation, utilization, and engine load. Model output is an emission factor in grams per horsepower hour. The emission factor was multiplied by number of equipment, horsepower, hours of operation per year, a utilization factor, and a load factor to calculate the total annual emissions due to each equipment type.

Exhaust emission factors of haul trucks and worker commute vehicles were estimated using EPA's MOBILE6.2 model. MOBILE6.2 model inputs were provided by the Puget Sound Regional Council, as described in the Air Quality Discipline Report. Model output is in the units of grams per vehicle miles traveled (VMT). VMT for haul trucks and worker commute vehicles was estimated based on the number of truck trips and workers and on the estimated round trip distances for the vehicles. The MOBILE6.2 emission factor was multiplied by VMT to estimate the total emissions per year for each pollutant. A detailed list of assumptions used to calculate vehicle and equipment exhaust is included in Attachment 2.

The exact schedule of specific activities cannot be estimated at this time. Throughout the construction duration, there will be periods of increased and decreased activity. The emissions calculations do not capture daily peaks or lulls in activity, but they are good estimate for annual totals. Construction activities at each of the analyzed locations will last for multiple years.

## **Asphalt Paving**

Asphalt paving would result in VOC emissions. The default emission factor of 2.62 pounds per acre in URBEMIS2007 was used to calculate VOC emissions for the acreage provided by the transportation team at each construction location.

## **Other Possible Emission Sources**

Project construction could include additional activities that are not as easily quantified as the activities previously discussed. Slash disposal and burning is an activity not likely to occur onsite, but that would contribute to particulate matter emissions if it did occur.

## **Operations**

### **Regional Air Quality**

The Preferred Alternative does not meet the annual average daily traffic volume to warrant a quantitative MSAT analysis. The average annual daily traffic (AADT) volume under the Preferred Alternative (120,900) is below FHWA's recommended threshold of 140,000 AADT for quantitative



MSAT analysis. However, based on comments received from the public and the EPA, this type of analysis was conducted for the Preferred Alternative.

Emissions for each of the seven priority MSATs were estimated for the SR 520 corridor. Vehicle volume and average speed data was provided by the traffic analyst for a series of segments representing eastbound and westbound traffic on SR 520. The MOBILE6.2 mobile source emissions model was used to estimate an emission factor in grams per mile for all vehicle speeds. The emissions for each segment were determined by multiplying the emission factor by the segment length and the segment volume. Emissions from each segment were added together for a total emission value in tons per year for SR 520. Emissions were calculated for the Preferred Alternative in 2030, No Build 2030, and existing conditions (2008). There are no standards or thresholds for MSAT emissions, and the discussion was limited to a comparison of the scenarios.

## **Health Effects Associated with Estimated Emissions**

Criteria pollutant health effects were included in Attachment 1 of the 2009 Air Quality Discipline Report (WSDOT 2009a). The MSAT discussion includes information from FHWA regarding information that is incomplete or unavailable to determine MSAT health effects.

## **Emissions Burden Analysis**

An emissions burden analysis for existing conditions, the No Build Alternative, and the Preferred Alternative was also conducted for the Final EIS using the MOBILE6.2 model, the same method described on pages 23 through 24 of the Air Quality Discipline Report (WSDOT 2009a). The analysis for both alternatives is based on the transportation analysis conducted for the Final EIS (see the Final Transportation Discipline Report [WSDOT 2011d]). Emissions estimates were revised based on provided values for VMT for existing conditions, the updated No Build Alternative, and the Preferred Alternative.

Operating conditions in the design year 2030 were assumed to be consistent with the assumptions used in the transportation analysis conducted for this Final EIS. Major assumptions that were revised since publication of the SDEIS include:

- Tolling is assumed to be single-point, rather than the segmental tolling assumed in the SDEIS analysis. As with the SDEIS analysis, 3+ HOV would be exempt from the toll.
- The No Build Alternative in the opening year (2018) would be tolled. Tolling would be single-point. By 2030, a toll on the No Build Alternative would no longer be in effect. The complete East Link light rail line is assumed to be in operation in 2030. East Link includes light rail across the I-90 bridges.

These changes in transportation network assumptions affected the traffic data that was used for the Final EIS air quality analyses. Most notably the changes in vehicle volumes were seen to have a noticeable effect on air quality calculations.



## Local Air Quality

### Local Carbon Monoxide Analysis

A local carbon monoxide (hot spot) analysis was completed for the project since it is located in a maintenance area for CO, and project-level analysis is necessary to verify that no localized effects would cause or contribute to a violation of the NAAQS. Using the methodology described on pages 24 through 25 of the Air Quality Discipline Report (WSDOT 2009a), the CO hot spot analysis that was conducted for SDEIS Options A, K, and L was completely revised for this addendum to consider the data specific to the Preferred Alternative. In addition, the hot spot analysis incorporates revised transportation network assumptions discussed in the Final Transportation Discipline Report (WSDOT 2011d). EPA CO guidance recommends that intersections that are level of service A, B, or C do not require further analysis because the delay and congestion would not likely cause or contribute to a potential exceedance of the CO NAAQS (EPA 1992). Of the 19 signalized intersections evaluated for the Final EIS in the study area, five are predicted to have a level of service of D or worse during one or both peak hours of the day for the Preferred Alternative. The five intersections for which CO hot spot analysis was conducted are shown on Exhibit 5 and are:

- Montlake Boulevard and Lake Washington Boulevard/SR 520 Eastbound Ramps
- Montlake Boulevard and East Shelby Street
- Montlake Boulevard and Pacific Street
- Montlake Boulevard and Pacific Place
- Pacific Street and 15th Avenue NE

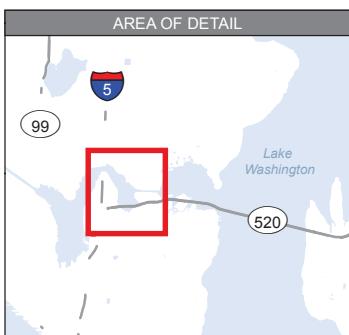
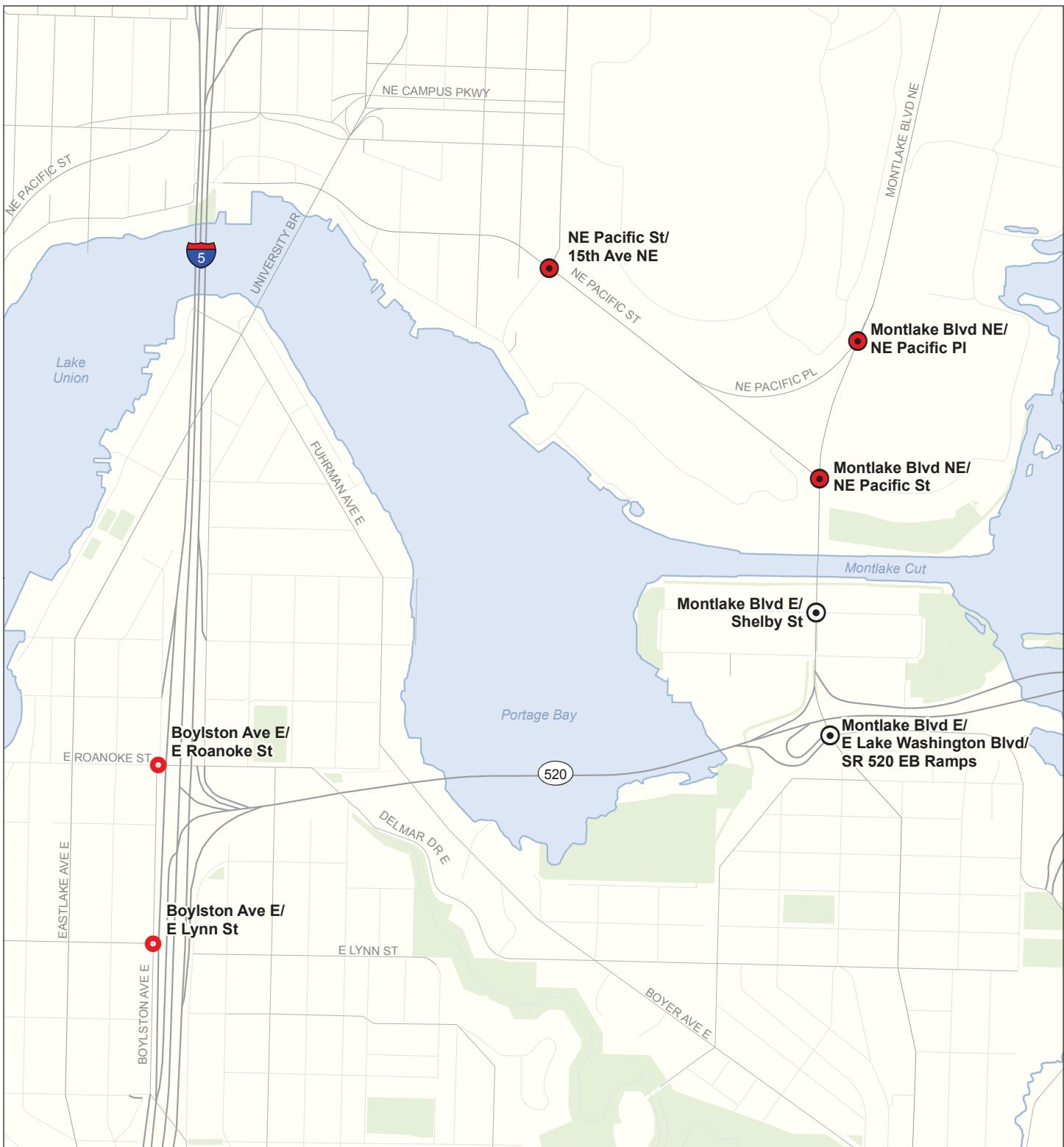
The intersections of Boylston Avenue with East Lynn Street and with East Roanoke Street were included in the SDEIS, but were not analyzed for this addendum. Under the Preferred Alternative, there would be minimal change to traffic operations at these intersections from updated No Build conditions and traffic data was not revised for the Final EIS.

As in the analysis conducted for the 2009 Air Quality Discipline Report, each studied intersection was evaluated using WSDOT's WASIST model. WASIST was run using traffic data provided for existing conditions (2008), opening year (2018), and 2030. Inputs to WASIST included traffic volumes and signal timing.

The regional transportation plan, Transportation 2040, was adopted by the Puget Sound Regional Council in May 2010. Because Transportation 2040, which calculated regional emissions for the same year, is now in effect, the project is required to show conformity to air quality standards in 2040. The project is subject to these conformity requirements because it is a major transportation project located in a maintenance area for CO. The 2009 Air Quality Discipline Report further discusses conformity requirements (WSDOT 2009a, pages 19 through 22).

To estimate vehicle volumes in 2040, the analyst applied a growth factor of 4.1 percent to 2030 traffic volumes at the modeled intersections, for both the Preferred Alternative and Build Alternative, before inputting the volumes and signal timing into WASIST (Landsberg 2010).





- Study Intersection (Preferred Alternative)
- Study Intersection (SDEIS Options)

Source: King County (2005) GIS Data (Streams and Streets), King County (2007) GIS Data (Water Bodies), and CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

N  
0 250 500 1,000 Feet



#### Exhibit 5. Intersections Evaluated for CO

I-5 to Medina: Bridge Replacement and HOV Project

The WASIST results are presented in Attachment 2. A background value of 5 parts per million (ppm) was added to all model results, as recommended in guidance for urban areas (EPA 1992). It was assumed that if the worst-case intersections did not cause a violation of the NAAQS under the Preferred Alternative, then the remaining intersections also would not cause a violation of the NAAQS under the Preferred Alternative.

### **Montlake Lid Evaluation**

The Montlake lid is proposed to be approximately 1,400 feet long, thereby requiring ventilation similar to a tunnel based on current design concepts. There is no requirement for analysis of air quality at tunnel vents or portals. However, based on public feedback, this addendum includes a qualitative discussion of likely air quality effects from the project at the vents and portals of the proposed lid. The analyst compared the tunnel to the proposed Alaskan Way Viaduct Central Waterfront tunnel where a quantitative analysis of air quality effects was recently conducted. To estimate whether effects would be similar, greater, or lower than that tunnel, analysts considered the lid's proposed length, traffic volumes, and percentage of diesel traffic.

## **How would construction of the Preferred Alternative affect air quality?**

During construction of roadway projects, soil-disturbing activities, heavy-duty equipment, commuting construction workers, and the laying of asphalt may generate emissions that can temporarily affect air quality. The regulated pollutants of concern for fugitive dust are PM<sub>2.5</sub> and PM<sub>10</sub>. Engine and motor vehicle exhaust would result in emissions of VOC, NOx, PM<sub>10</sub>, PM<sub>2.5</sub>, and MSATs.

Construction would be sequenced over a period of approximately 7 years. Construction activities were considered for six geographical locations, as described in the Construction Techniques and Activities Discipline Report Addendum and Errata (WSDOT 2011c). The duration of construction activities varied by location. Pollutant emissions for the peak year of construction are summarized in Exhibit 6. The emissions presented are for the Preferred Alternative. The No Build Alternative would not result in any emissions because no construction activities would occur.

**Exhibit 6. Summary of Construction Air Quality Effects by Area**

<b>Area</b>	<b>Peak Year</b>	<b>Annual Emissions in Tons/Year</b>				
		<b>CO</b>	<b>VOC</b>	<b>NOX</b>	<b>PM10</b>	<b>PM2.5</b>
Evergreen point Bridge and Eastside Transition Areas	2012	65.9	8.4	105.9	15.7	7.8
West Approach Area	2014	24.1	3.3	37.5	8.2	3.4
Portage Bay Bridge Area	2014	23.3	3.2	34.4	7.8	3.2



### Exhibit 6. Summary of Construction Air Quality Effects by Area

Area	Peak Year	Annual Emissions in Tons/Year				
		CO	VOC	NOX	PM10	PM2.5
Montlake Interchange and Bascule Bridge Areas	2014	16.4	2.3	23.1	13.7	4.1
I-5 Interchange Area	2017	24.6	3.3	27.1	6.0	2.6

Exhibit 6 summarizes air quality effects in six construction areas. For each area, emissions from the peak year are presented to show the maximum annual emissions associated with that specific area. Detailed tables estimated and totaling emissions for each criteria pollutant in each year for each geographic area are included in Attachment 2.

The air quality effects of constructing Options A, K, and L were not analyzed quantitatively in the 2009 Air Quality Discipline Report (WSDOT 2009a, pages 27 through 28). Due to the detailed information required for this type of analysis, construction emissions were calculated only for the Preferred Alternative. However, it is possible to qualitatively compare the Preferred Alternative to Option A. Based on the similarities between their design features and their expected construction activities and durations, if Option A were analyzed quantitatively, its effects would likely be similar to those of the Preferred Alternative.

Due to the assumptions made for the estimation of annual emissions, total construction activities were evenly distributed over the duration of construction for each area. Using this assumption, Exhibit 3 demonstrates that the peak construction emissions occur during the first full year of activity at each location. The peak year in this analysis is driven by the age of equipment since it was assumed equal equipment usage for each year, and the first full year of construction includes the oldest age for the equipment fleet. Emission factors typically decrease by year as older and less efficient equipment are phased out. The greatest amount of emissions would be produced at the Evergreen Point Bridge and Eastside Transition areas because this location requires the most support equipment. The tugboats used for this construction area contribute the majority of the NOx and CO emissions. Detailed construction emission calculations by location and year are included as Attachment 2.

## How would operation of the Preferred Alternative affect air quality?

### Regional Air Quality

Effects would be similar to those described for Option A (WSDOT 2009a, pages 28 through 30). Like Option A, the Preferred Alternative would have no noticeable effect on regional air quality.



## Emissions Burden Analysis

Exhibit 7 shows the criteria emissions projected in the study area for the Preferred Alternative, Updated No Build Alternative in both 2030 and 2040, and Options A, K, and L in 2030. Updated No Build and Existing conditions calculations were performed to reflect the changes to the transportation network assumptions. Revised existing 2008 volumes for the SR 520 area were higher than volumes reported in the SDEIS. 2030 updated No Build and Preferred Alternative vehicle volumes were less than all 2030 volumes from the SDEIS (please see the Final Transportation Discipline Report for a discussion of the differences between alternatives). Projected 2030 pollutant emissions are less than the values presented in the SDEIS, and there is no noticeable difference between regional emissions due to the No Build alternative or the Preferred Alternative.

Exhibit 7. Burden Emissions Analysis—Daily Project Emissions of Criteria Pollutants (tons per day) (Update to Exhibit 13 of the 2009 Discipline Report)

Alternative	VMT	CO	CO % of SIP Budget	VOCs	NOx	PM <sub>10</sub>	PM <sub>2.5</sub>
2008 Existing	10,996,900	222	9%	15.5	23.3	0.6	0.4
2030 No Build	13,803,200	175	7%	7.7	7.5	0.4	0.2
2030 Option A	13,785,200	175	7%	7.7	7.5	0.4	0.2
2030 Option K/L	13,866,800	175	7%	7.7	7.6	0.4	0.2
2008 Revised Existing	11,200,000	226	9%	15.1	23.5	0.6	0.4
2030 Revised No Build	13,100,000	166	7%	7.3	7.2	0.4	0.2
2030 Preferred Alternative	13,100,000	166	7%	7.2	7.1	0.4	0.2
SIP Budget	N/A	2,510		N/A	N/A	N/A	N/A

Note: Emissions were calculated using the MOBILE6.2 emission factor for 30 miles per hour and the daily VMT from the Transportation Discipline Report (WSDOT 2009c). State Implementation Plan (SIP) inventory data are from 61 Federal Register (FR) 53323 (October 11, 1996), which was established through the year 2010. Pollutant emissions in ton/day should not be compared to NAAQS, which are pollutant concentrations.

## Mobile Source Air Toxics

Emissions were estimated for the seven priority air toxics due to traffic on SR 520. Emissions were calculated for existing conditions (2008), updated No Build 2030, and the Preferred Alternative in 2030. The results are summarized in Exhibit 8.



**Exhibit 8. MSAT Emissions Analysis—Daily Project Emissions of Criteria Pollutants (tons per day)**

Alternative	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	POM	DPM
2008 Existing	0.00026	0.01752	0.001368	0.004353	0.000263	2.49E-06	0.0152
2030 No Build	0.00013	0.00990	0.000705	0.002236	0.000183	1.35E-06	0.0135
2030 Preferred Alternative	0.00012	0.00934	0.000658	0.002020	0.000179	1.33E-06	0.0132

Note: Emissions were calculated using MOBILE6.2 emission factors based on speed of various segments, as provided by the Transportation Discipline Report (WSDOT 2009c).

As seen in Exhibit 8, MSAT emissions would be lower for the Preferred Alternative than emissions for the updated No Build Alternative in 2030. This is due to the general increase in vehicle speed that would be a result of reduced congestion. The emissions in 2030 would be significantly lower than the emissions in 2008. This is consistent with FHWA projections, and would be due to vehicle and fuel technological advancements, as discussed in the 2009 Air Quality Discipline Report (WSDOT 2009a). The Preferred Alternative would not cause an adverse effect due to MSAT emissions.

Air toxics is an emerging field and current scientific techniques, tools, and data are not sufficient to accurately estimate human health effects that would result from a transportation project in a way that would be useful to decision-makers in a National Environmental Policy Act (NEPA) context. The following information is provided by FHWA to address information that is incomplete or unavailable for a project specific assessment of MSAT effects.

### **Incomplete or Unavailable Information for Project-Specific MSAT Health Effects Analysis**

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health effects due to changes in MSAT emissions associated with a proposed set of highway alternatives (FHWA 2009). The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health effects directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA 2010b). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.



Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI 2007a) or in the future as vehicle emissions substantially decrease (HEI 2009).

The methodologies for forecasting health effects include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health effects - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health effects among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that period, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's Draft MOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in a National Cooperative Highway Research Program study, which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring (National Cooperative Highway Research Program 2002). The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with NAAQS for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (HEI 2007a). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA and the HEI have not established a basis for quantitative risk assessment of diesel PM in ambient settings (EPA 2010c and HEI 2007b).



There is also the lack of a national consensus on an acceptable level of risk. Currently, the process used by the EPA, as provided by the Clean Air Act, determines if more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health effects described, any predicted difference in health effects between alternatives is likely to be much smaller than the uncertainties associated with predicting the effects. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Due to the limitations cited, a discussion such as the example provided in Appendix C of *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (reflecting any local and project-specific circumstances), should be included regarding incomplete or unavailable information in accordance with Council on Environmental Quality (CEQ) regulations [40 CFR 1502.22(b)]. FHWA Headquarters and Resource Center staff [Victoria Martinez (787) 766-5600 X231, Shari Schaftlein (202) 366-5570, and Michael Claggett (505) 820-2047] are available to provide guidance and technical assistance and support.

## Local Air Quality

Localized concentrations of criteria pollutants were evaluated near five signalized intersections in the project corridor (Exhibits 9 and 10). Two of the intersections (Montlake Boulevard/Lake Washington Boulevard/SR 520 eastbound ramps and Montlake Boulevard/East Shelby Street) are above the 8-hour NAAQS of 9 ppm, which is currently the standard.

Modeling shows that CO concentrations would improve and would be below the 1-hour and 8-hour NAAQS for all future year SDEIS options (2018 through 2040), including the No Build Alternative and the Preferred Alternative.



**Exhibit 9. Maximum 1-Hour Carbon Monoxide Concentrations (ppm) (Update to Exhibit 15 of the 2009 Discipline Report)**

<b>Intersection Name</b>	<b>2008 Existing</b>	<b>2018 No Build</b>	<b>2018 Preferred Alternative</b>	<b>2030 No Build</b>	<b>2030 Preferred Alternative</b>	<b>2040 No Build</b>	<b>2040 Preferred Alternative</b>
Montlake Blvd./Lake Washington Blvd./SR 520 Eastbound Ramps	11.9	9.2	9.0	9	9.6	9.0	10.3
Montlake Blvd./East Shelby St.	11.5	9.0	8.9	9	9.0	9.2	9.1
Montlake Blvd./Pacific Pl.	9.7	7.9	7.9	7.8	7.8	7.8	7.9
Pacific St./ 15th Ave. NE	9.4	7.5	7.5	7.5	7.4	7.5	7.5
Montlake Blvd./Pacific St.	10.2	7.5	8.6	8.3	8.4	8.3	8.5
<b>1-Hour CO NAAQS</b>	<b>35 ppm</b>						

Note: All concentrations include a background concentration of 5 ppm.

**Exhibit 10. Maximum 8-Hour Carbon Monoxide Concentrations (ppm) (Update to Exhibit 16 of the 2009 Discipline Report)**

<b>Intersection Name</b>	<b>2008 Existing</b>	<b>2018 No Build</b>	<b>2018 Preferred Alternative</b>	<b>2030 No Build</b>	<b>2030 Preferred Alternative</b>	<b>2040 No Build</b>	<b>2040 Preferred Alternative</b>
Montlake Blvd./Lake Washington Blvd./SR 520 Eastbound Ramps	9.8	8.5	8.4	7.8	8.2	7.8	8.7
Montlake Blvd./East Shelby St.	9.5	8.0	8.1	7.8	7.8	7.9	7.9
Montlake Blvd./Pacific Pl.	8.3	7.0	7.0	7.0	7.0	7.0	7.0
Pacific St./ 15th Ave NE	8.1	6.8	6.8	6.8	6.7	6.8	6.8
Montlake Blvd./Pacific St.	8.6	7.4	7.4	7.3	7.4	7.3	7.4
<b>8-Hour CO NAAQS</b>	<b>9 ppm</b>						

Note: All concentrations include a background concentration of 5 ppm

## **Montlake Lid Vents and Portals**

Under the Preferred Alternative, the Montlake lid would be approximately 1,400 feet long with vents, fire suppression, and lighting, and it therefore has unique air quality concerns regarding emissions exiting the lid (at vents and at portals). Emissions captured by the ventilation system would be released through exhaust vents. Air emissions from portals form a plume that is both pushed out of the lid by vehicles before they exit and dragged out of the portal by these same vehicles as they move downstream of the portal.

The Alaskan Way Viaduct (AWV) Replacement Project Draft Environmental Impact Statement included detailed modeling of emissions from tunnel portals and vents. The AWV Central



Waterfront tunnel is proposed to be 1.7 miles long with four ventilation buildings (Parsons Brinckerhoff Quade and Douglas, Inc. 2004). The AWV forecasted 2030 AADT is 93,900 vehicles with 3.5 percent heavy diesel vehicles, which is of the same order of magnitude as the SR 520 2030 AADT is 120,900 vehicles with 3 percent heavy diesel vehicles. Although the AWV traffic volume is less than SR 520 traffic volume, the AWV tunnel is much longer. For this addendum, it was assumed that the air quality effects of the Montlake lid would be equal to or less than those modeled for the AWV tunnel. CO was modeled because the project is located in a CO maintenance area. PM<sub>2.5</sub> was also modeled to address any concerns regarding PM<sub>2.5</sub> from diesel exhaust.

Analysis of the AWV tunnel included emissions from tunnel portals, emissions from downstream traffic, emissions from traffic on nearby surface streets, exhaust from tunnel operations buildings (vents), and a background ambient concentration. Dispersion modeling was performed to estimate total CO and PM<sub>2.5</sub> concentrations at receptors near tunnel portals at locations that would be accessible to the public, and ground-level and elevated receptors at nearby buildings. The maximum modeled CO and PM<sub>2.5</sub> concentrations are summarized in Exhibit 11. All modeled concentrations were below the NAAQS, meaning the project would not have a negative effect on air quality. Because the AWV has similar vehicle volume and percentage of diesel vehicles, and the AWV tunnel is significantly longer than the Montlake lid, the Montlake lid would be expected to have emissions equal to or less than AWV tunnel emissions. Therefore, the Montlake lid would not be expected to result in exceedances of the NAAQS.

**Exhibit 11. Maximum Modeled CO and PM<sub>2.5</sub> Emissions from Alaskan Way Viaduct Model Analysis**

Pollutant	Maximum Modeled Concentration	NAAQS
1-hour CO	10.0 ppm	35 ppm
8-hour CO	4.1 ppm	9 ppm
24-hour PM <sub>2.5</sub>	23.9 µg/m <sup>3</sup>	35 µg/m <sup>3</sup>
Annual PM <sub>2.5</sub>	8.2 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>

Source: Parsons Brinckerhoff Quade and Douglas, Inc. 2004

## Does the project meet project-level conformity requirements?

Because the project is not anticipated to create any new violations, nor increase the frequency of an existing violation of the CO standard, it conforms with the purpose of the current SIP and the requirements of the federal Clean Air Act and the Washington Clean Air Act. The proposed project is included in the regional transportation plan, Transportation 2040 (Puget Sound Regional Council [PSRC] 2010a), and in the 2010-2013 transportation improvement program (PSRC 2010b). The regional transportation plan and the transportation improvement program meet the conformity requirements identified by federal and state regulations for CO.



## How do the operation effects on air quality compare to the SDEIS Options?

The Preferred Alternative as well as all the SDEIS options would meet air quality standards. The modeled concentrations of air pollutants are below the 1-hour and 8-hour NAAQS for all design option in all future years. Construction effects would be temporary. MSAT emissions are expected to decrease between existing conditions and future years, regardless of the design option.

## Mitigation

### What has been done to avoid or minimize negative effects?

During project operations, air quality would improve from current conditions under both the Preferred Alternative and the No Build Alternative, because of the introduction of cleaner fuels and more efficient vehicle engines. A number of features of the Preferred Alternative serve to reduce vehicle miles traveled regionally and within the project area, thereby reducing potential emissions. These features include:

- Continuous HOV lanes across the floating bridge, which would provide improved transit speed and reliability and may allow for more transit service
- A reversible, direct access HOV ramp between I-5 and SR 520
- A direct access HOV ramp in both directions at the Montlake Boulevard interchange, along with HOV lanes on Montlake Boulevard between SR 520 and the Montlake Cut. A bicycle/pedestrian lane with connections to regional and local trails
- A gap between westbound and eastbound lanes in the west approach and floating bridge areas to allow for future light rail transit

### Best Management Practices

During construction, best management practices would be used to minimize construction emissions. For construction effects, state law requires construction site owners and/or operators to take reasonable precautions to prevent fugitive dust from becoming airborne. Fugitive dust may become airborne during demolition, material transport, grading, driving vehicles and machinery on and off the site, and wind events.



WSDOT will comply with the procedures outlined in the Memorandum of Agreement between WSDOT and the Puget Sound Clean Air Agency for controlling fugitive dust (WSDOT 2008). Controlling fugitive dust emissions may require some of the following actions:

- Spray exposed soil with water or other dust suppressant to reduce emissions of PM<sub>10</sub> by increasing deposition of particulate matter.
- Use phased development to keep disturbed areas to a minimum.
- Use site screening to manage potential transport of fugitive dust.
- Minimize dust emissions during transport of excavated or fill materials by wetting down loads or ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly clean up spills of transported material on public roads.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restrict traffic onsite to reduce soil upheaval and tracking material onto roadways.
- Provide wheel washers to decrease deposition of particulate matter on area roadways by removing particulate matter that would otherwise be carried offsite by vehicles.
- Locate construction equipment and truck staging areas away from sensitive receptors as practical and in consideration of potential effects on other resources.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.

Emissions of PM<sub>10</sub>, PM<sub>2.5</sub>, VOCs, NOx, and CO would be minimized whenever reasonable and possible. Since these emissions primarily result from construction equipment, machinery engines would be kept in good mechanical condition to minimize exhaust emissions.

Federal regulations require the use of ultra-low-sulfur diesel fuel in on-road trucks as well as for construction equipment as of 2010. These regulations require reduction of the sulfur content of diesel fuel from 500 ppm to 15 ppm—a 97 percent reduction—and will result in a decrease of both SO<sub>2</sub> and PM emissions from these engines. WSDOT encourages its contractors to reduce idling time of equipment and vehicles and to use newer construction equipment or equipment with add-on emission controls.

## **What would be done to mitigate negative effects that could not be avoided or minimized?**

### **Construction Mitigation**

Emissions from construction activities would be temporary, and no adverse effects are expected to remain after avoidance and minimization measures are applied during construction.



## Operation Mitigation

Operationally, as noted above, air quality would improve from current conditions because of the introduction of cleaner fuels and more efficient vehicle engines. Thus, no mitigation measures are expected to be required.

## What negative effects would remain after mitigation?

Similar to Option A, no negative effects are expected from construction because fugitive dust emissions will be minimized. As noted above, no negative effects that would require mitigation are expected from operations under the Preferred Alternative or the No Build Alternative, as with the SDEIS options.

## References

The following list of references is in addition to those listed in the 2009 Air Quality Discipline Report.

40 CFR 50 (*Code of Federal Regulations* Title 40, Part 50, Subchapter C). National Primary and Secondary Ambient Air Quality Standards. Accessed on January 4, 2011 at:  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=aaaa27ce7ce69da69de13bddba7134c5&rgn=div5&view=text&node=40:2.0.1.1.1&idno=40>.

40 CFR 93 (CFR Title 40, Part 93, Subpart A). Determining Conformity of Federal Actions to State or Federal Implementation Plans. Subpart A: Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded, or Approved under Title 23 U.S.C. or the Federal Transit Laws. Federal Register Vol. 62, No. 43801. Washington, D.C.: August 15, 1997. Accessed on December 22, 2010 at: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=40:20.0.1.1.7.1&idno=40>.

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# Attachment 1

## Air Quality Discipline Report Errata

The following table corrects errors and provides clarifications to the Air Quality Discipline Report (WSDOT 2009a). Information contained in this table does not change the results or conclusions of any analyses in the 2009 discipline report.

Page	Current Text	Corrected Text/Clarification
2	<ul style="list-style-type: none"><li>Usual and accustomed fishing areas of tribal nations that have historically used the area's aquatic resources and have treaty rights</li></ul>	<ul style="list-style-type: none"><li>Usual and accustomed fishing areas of <u>the Muckleshoot Tribe, which has tribal nations that have</u> historically used the area's aquatic resources and <u>has have</u> treaty rights <u>for their protection and use</u></li></ul>





## **Attachment 2**

# **Construction Emissions, Vehicle and Fugitive Emissions, WASIST Intersection Data, and Construction Air Quality Effects Data**



## **Attachment 2A**

### **Summary of Construction Emissions**



**SR 520 Construction Emissions**

**Summary of all Areas and Years**

Total for All Emission types							On Road Hauling						
Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)							Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2012	105.94	65.90	0.14	8.40	15.73	7.83	2012 Emissions	1.60	0.33	0.00	0.08	0.06	0.04
2013	105.62	64.66	0.14	8.23	15.72	7.83	2013 Emissions	1.40	0.25	0.00	0.08	0.05	0.04
2014	99.92	60.98	0.14	7.81	15.28	7.40	2014 Emissions	1.21	0.21	0.00	0.07	0.04	0.03
2015	47.33	28.90	0.07	3.72	7.43	3.50	2015 Emissions	0.53	0.09	0.00	0.03	0.02	0.01
2016	0.00	0.00	0.00	0.00	0.00	0.00	2016 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00	2017 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2018	0.00	0.00	0.00	0.00	0.00	0.00	2018 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
West Approach Area Emissions (tpy)							West Approach Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2012	0.00	0.00	0.00	0.00	0.00	0.00	2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2013	30.83	19.59	0.04	2.65	6.38	2.77	2013 Emissions	0.49	0.09	0.00	0.03	0.02	0.01
2014	37.35	24.11	0.06	3.30	8.23	3.42	2014 Emissions	0.56	0.10	0.00	0.03	0.02	0.01
2015	33.87	22.34	0.05	3.08	7.97	3.17	2015 Emissions	0.49	0.09	0.00	0.03	0.02	0.01
2016	29.87	20.31	0.05	2.84	7.69	2.90	2016 Emissions	0.43	0.08	0.00	0.03	0.02	0.01
2017	27.94	19.38	0.05	2.74	7.56	2.78	2017 Emissions	0.37	0.07	0.00	0.03	0.01	0.01
2018	12.71	9.00	0.03	1.30	3.70	1.31	2018 Emissions	0.16	0.03	0.00	0.01	0.01	0.00
Portage Bay Bridge Area Emissions (tpy)							Portage Bay Bridge Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2012	0.00	0.00	0.00	0.00	0.00	0.00	2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2013	19.10	12.67	0.03	1.70	4.05	1.76	2013 Emissions	0.39	0.07	0.00	0.02	0.01	0.01
2014	34.38	23.30	0.05	3.15	7.81	3.24	2014 Emissions	0.66	0.12	0.00	0.04	0.02	0.02
2015	30.84	21.50	0.05	2.94	7.55	2.98	2015 Emissions	0.58	0.10	0.00	0.04	0.02	0.01
2016	26.83	19.47	0.05	2.69	7.27	2.71	2016 Emissions	0.50	0.09	0.00	0.04	0.02	0.01
2017	24.82	18.50	0.05	2.58	7.14	2.58	2017 Emissions	0.44	0.08	0.00	0.03	0.02	0.01
2018	22.26	17.11	0.05	2.44	6.98	2.43	2018 Emissions	0.37	0.07	0.00	0.03	0.01	0.01
Montlake Interchange and Bascule Bridge Area Emissions (tpy)							Montlake Interchange and Bascule Bridge Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2012	0.00	0.00	0.00	0.00	0.00	0.00	2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2013	6.48	4.48	0.01	0.61	3.47	1.07	2013 Emissions	0.18	0.03	0.00	0.01	0.01	0.01
2014	23.12	16.38	0.04	2.26	13.67	4.05	2014 Emissions	0.62	0.11	0.00	0.04	0.02	0.02
2015	20.55	15.01	0.04	2.10	13.45	3.84	2015 Emissions	0.54	0.09	0.00	0.03	0.02	0.01
2016	18.29	13.75	0.04	1.97	13.28	3.67	2016 Emissions	0.47	0.08	0.00	0.03	0.02	0.01
2017	16.28	12.75	0.04	1.85	13.13	3.53	2017 Emissions	0.40	0.07	0.00	0.03	0.02	0.01
2018	14.47	11.72	0.04	1.74	13.00	3.40	2018 Emissions	0.34	0.06	0.00	0.03	0.01	0.01
I-5 Interchange Area Emissions (tpy)							I-5 Interchange Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2012	0.00	0.00	0.00	0.00	0.00	0.00	2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	2013 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00	2014 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00	2015 Emissions	0.00	0.00	0.00	0.00	0.00	0.00
2016	15.35	13.22	0.03	1.78	3.16	1.43	2016 Emissions	0.17	0.03	0.00	0.01	0.01	0.00
2017	27.13	24.56	0.06	3.34	6.04	2.60	2017 Emissions	0.28	0.05	0.00	0.02	0.01	0.01
2018	23.95	22.60	0.06	3.15	5.81	2.37	2018 Emissions	0.23	0.04	0.00	0.02	0.01	0.01

Highlight represents year of peak emissions

**SR 520 Construction Emissions**

Summary of all Areas and Years

Worker Commute						Fugitive Dust			Paving		Non-Road Construction Equipment Exhaust						
Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)											Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	PM10 Emissions (tpy)	PM2.5 Emissions (tpy)	VOC Emissions (tpy)	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	
2012 Emissions	1.33	25.12	0.01	1.43	0.04	0.02	9.6798	2.032758	0.0	2012	103.01	40.45	0.12	6.89	5.96	5.74	
2013 Emissions	1.21	23.96	0.01	1.26	0.04	0.02	9.6798	2.032758	0.0	2013	103.01	40.45	0.12	6.89	5.96	5.74	
2014 Emissions	1.10	22.92	0.01	1.17	0.04	0.02	9.6798	2.032758	0.0	2014	97.61	37.85	0.12	6.57	5.52	5.32	
2015 Emissions	0.51	11.09	0.01	0.54	0.02	0.01	4.8399	1.016379	0.0	2015	46.29	17.71	0.06	3.14	2.55	2.46	
2016 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2016	0.00	0.00	0.00	0.00	0.00	0.00	
2017 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2017	0.00	0.00	0.00	0.00	0.00	0.00	
2018 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2018	0.00	0.00	0.00	0.00	0.00	0.00	
West Approach Area Emissions (tpy)						West Approach Area Emissions (tpy)											
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	PM10 Emissions (tpy)	PM2.5 Emissions (tpy)	VOC Emissions (tpy)	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	
2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2012	0.00	0.00	0.00	0.00	0.00	0.00	
2013 Emissions	0.39	7.66	0.00	0.40	0.01	0.01	4.484025	0.94164525	0.0	2013	29.96	11.85	0.04	2.22	1.87	1.81	
2014 Emissions	0.47	9.77	0.01	0.50	0.02	0.01	5.9787	1.255527	0.0	2014	36.32	14.25	0.05	2.77	2.21	2.14	
2015 Emissions	0.43	9.46	0.01	0.46	0.02	0.01	5.9787	1.255527	0.0	2015	32.95	12.80	0.05	2.59	1.95	1.89	
2016 Emissions	0.39	9.04	0.01	0.43	0.02	0.01	5.9787	1.255527	0.0	2016	29.05	11.19	0.05	2.38	1.68	1.63	
2017 Emissions	0.36	8.81	0.01	0.40	0.02	0.01	5.9787	1.255527	0.0	2017	27.21	10.50	0.05	2.31	1.55	1.50	
2018 Emissions	0.16	4.20	0.00	0.18	0.01	0.00	2.98935	0.6277635	0.0	2018	12.39	4.77	0.02	1.10	0.70	0.68	
Portage Bay Bridge Area Emissions (tpy)						Portage Bay Bridge Area Emissions (tpy)											
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	PM10 Emissions (tpy)	PM2.5 Emissions (tpy)	VOC Emissions (tpy)	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	
2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2012	0.00	0.00	0.00	0.00	0.00	0.00	
2013 Emissions	0.26	5.20	0.00	0.27	0.01	0.00	2.847	0.59787	0.0	2013	18.45	7.40	0.02	1.40	1.18	1.14	
2014 Emissions	0.48	9.94	0.01	0.51	0.02	0.01	5.694	1.19574	0.0	2014	33.23	13.24	0.05	2.61	2.08	2.02	
2015 Emissions	0.44	9.63	0.01	0.47	0.02	0.01	5.694	1.19574	0.0	2015	29.82	11.77	0.04	2.43	1.81	1.76	
2016 Emissions	0.40	9.21	0.01	0.44	0.02	0.01	5.694	1.19574	0.0	2016	25.93	10.17	0.04	2.22	1.54	1.50	
2017 Emissions	0.36	8.97	0.01	0.41	0.02	0.01	5.694	1.19574	0.0	2017	24.02	9.45	0.04	2.14	1.41	1.37	
2018 Emissions	0.33	8.56	0.01	0.38	0.02	0.01	5.694	1.19574	0.0	2018	21.57	8.48	0.04	2.03	1.25	1.22	
Montlake Interchange and Bascule Bridge Area Emissions (tpy)						Montlake Interchange and Bascule Bridge Area Emissions (tpy)											
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	PM10 Emissions (tpy)	PM2.5 Emissions (tpy)	VOC Emissions (tpy)	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	
2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.0	2012	0.00	0.00	0.00	0.00	0.00	0.00	
2013 Emissions	0.09	1.75	0.00	0.09	0.00	0.00	3.0249375	0.63523688	0.0	2013	6.22	2.70	0.01	0.51	0.44	0.43	
2014 Emissions	0.32	6.70	0.00	0.34	0.01	0.01	12.09975	2.5409475	0.0	2014	22.18	9.58	0.03	1.88	1.54	1.49	
2015 Emissions	0.30	6.48	0.00	0.32	0.01	0.01	12.09975	2.5409475	0.0	2015	19.72	8.43	0.03	1.75	1.32	1.28	
2016 Emissions	0.27	6.20	0.00	0.29	0.01	0.01	12.09975	2.5409475	0.0	2016	17.55	7.46	0.03	1.64	1.15	1.11	
2017 Emissions	0.25	6.04	0.00	0.27	0.01	0.01	12.09975	2.5409475	0.0	2017	15.63	6.63	0.03	1.54	1.00	0.97	
2018 Emissions	0.22	5.77	0.00	0.25	0.01	0.01	12.09975	2.5409475	0.0	2018	13.91	5.89	0.03	1.46	0.87	0.85	
I-5 Interchange Area Emissions (tpy)						I-5 Interchange Area Emissions (tpy)											
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	PM10 Emissions (tpy)	PM2.5 Emissions (tpy)	VOC Emissions (tpy)	Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5	
2012 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.003	2012	0.00	0.00	0.00	0.00	0.00	0.00	
2013 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.003	2013	0.00	0.00	0.00	0.00	0.00	0.00	
2014 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.003	2014	0.00	0.00	0.00	0.00	0.00	0.00	
2015 Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.003	2015	0.00	0.00	0.00	0.00	0.00	0.00	
2016 Emissions	0.29	6.74	0.00	0.32	0.01	0.01	2.13525	0.4484025	0.003	2016	14.89	6.45	0.03	1.45	1.01	0.98	
2017 Emissions	0.53	13.14	0.01	0.60	0.02	0.01	4.2705	0.896805	0.003	2017	26.31	11.37	0.05	2.73	1.74	1.68	
2018 Emissions	0.48	12.53	0.01	0.55	0.02	0.01	4.2705	0.896805	0.003	2018	23.24	10.02	0.05	2.58	1.50	1.46	

Highlight represents year of peak emissions

## **Attachment 2B**

### **Vehicle and Fugitive Emissions**



**SR520 Construction Emissions, Paving (Area)**

<b>Asphalt Emissions</b>	<b>Acres to be Paved</b>	<b>Inches Thick</b>
Mobilization	0	0
Reversible HOV Ramp	0.3	9
On-Westbound Mainline	0.3	12.5
Roanoke Lid	0	0
Eastbound Mainline and Ramps	0.3	9
10th Avenue/Delmar Lid	0.2	8
Demo Existing 10th/Delmar	0	0
Demo Existing Delmar Bridge	0	0
Delmar Lid	1	4
Demo Temp 10th Avenue Bridge	0	0
Portage Bay	0	0
Mountlake	0	0
West Approach	0	0
Floating Bridge	0	0
East Approach	0	0



**SR520 Construction Emissions, Paving (per Year)**

	VOC lb/acre	Paved Area (acres)	VOC Emissions (tpy)
<b>Evergreen Point Bridge and Eastside Transition Areas Emissions</b>			
2012 Emissions	2.62	0.00	0.0
2013 Emissions	2.62	0.00	0.0
2014 Emissions	2.62	0.00	0.0
2015 Emissions	2.62	0.00	0.0
2016 Emissions	2.62	0.00	0.0
2017 Emissions	2.62	0.00	0.0
2018 Emissions	2.62	0.00	0.0
<b>West Approach Area Emissions</b>			
2012 Emissions	2.62	0.00	0.0
2013 Emissions	2.62	0.00	0.0
2014 Emissions	2.62	0.00	0.0
2015 Emissions	2.62	0.00	0.0
2016 Emissions	2.62	0.00	0.0
2017 Emissions	2.62	0.00	0.0
2018 Emissions	2.62	0.00	0.0
<b>Portage Bay Area Emissions</b>			
2012 Emissions	2.62	0.00	0.0
2013 Emissions	2.62	0.00	0.0
2014 Emissions	2.62	0.00	0.0
2015 Emissions	2.62	0.00	0.0
2016 Emissions	2.62	0.00	0.0
2017 Emissions	2.62	0.00	0.0
2018 Emissions	2.62	0.00	0.0
<b>Montlake Interchange Area</b>			
2012 Emissions	2.62	0.00	0.0
2013 Emissions	2.62	0.00	0.0
2014 Emissions	2.62	0.00	0.0
2015 Emissions	2.62	0.00	0.0
2016 Emissions	2.62	0.00	0.0
2017 Emissions	2.62	0.00	0.0



**SR520 Construction Emissions, Paving (per Year)**

	<b>VOC lb/acre</b>	<b>Paved Area (acres)</b>	<b>VOC Emissions (tpy)</b>
2018 Emissions	2.62	0.00	0.0
<b>I-5 Interchange Area</b>			
2012 Emissions	2.62	2.10	0.003
2013 Emissions	2.62	2.10	0.003
2014 Emissions	2.62	2.10	0.003
2015 Emissions	2.62	2.10	0.003
2016 Emissions	2.62	2.10	0.003
2017 Emissions	2.62	2.10	0.003
2018 Emissions	2.62	2.10	0.003

Emission Factor from URBEMIS 2007 9.2.2

Paved Area Provided by WSDOT



**SR520 Construction Emissions, Site Grading Fugitive Dust Emissions (Area)**

<b>Area</b>	<b>Acres Worked</b>
Mobilization	0.1
Reversible HOV Ramp	0.3
On-Westbound Mainline	0.3
Roanoke Lid	0
Eastbound Mainline and Ramps	0.3
10th Avenue/Delmar Lid	0.2
Demo Existing 10th/Delmar	0.2
Demo Existing Delmar Bridge	0.2
Delmar Lid	1
Demo Temp 10th Avenue Bridge	0.4
Portage Bay	4
Mountlake	8.5
West Approach	4.2
Floating Bridge	4
East Approach	2.8



**SR520 Construction Emissions, Site Grading Fugitive Dust Emissions (per Year)**

	<b>PM<sub>10</sub> Ib/acre day</b>	<b>Acres Worked</b>	<b>Days Worked</b>	<b>Emissions Reduction Factor- Dust Control</b>	<b>PM<sub>10</sub> Emissions (tpy)</b>	<b>PM<sub>2.5</sub> Emissions (tpy)</b>
<b>Evergreen Point Bridge and Eastside Transition Areas Emissions</b>						
2012 Emissions	20	7	365	0.61	9.6798	2.032758
2013 Emissions	20	7	365	0.61	9.6798	2.032758
2014 Emissions	20	7	365	0.61	9.6798	2.032758
2015 Emissions	20	7	182.5	0.61	4.8399	1.016379
2016 Emissions	20	7	0	0.61	0	0
2017 Emissions	20	7	0	0.61	0	0
2018 Emissions	20	7	0	0.61	0	0
<b>West Approach Area Emissions</b>						
2012 Emissions	20	4.2	0	0.61	0	0
2013 Emissions	20	4.2	273.75	0.61	4.484025	0.94164525
2014 Emissions	20	4.2	365	0.61	5.9787	1.255527
2015 Emissions	20	4.2	365	0.61	5.9787	1.255527
2016 Emissions	20	4.2	365	0.61	5.9787	1.255527
2017 Emissions	20	4.2	365	0.61	5.9787	1.255527
2018 Emissions	20	4.2	182.5	0.61	2.98935	0.6277635
<b>Portage Bay Area Emissions</b>						
2012 Emissions	20	4.0	0	0.61	0	0
2013 Emissions	20	4.0	182.5	0.61	2.847	0.59787
2014 Emissions	20	4.0	365	0.61	5.694	1.19574
2015 Emissions	20	4.0	365	0.61	5.694	1.19574
2016 Emissions	20	4.0	365	0.61	5.694	1.19574
2017 Emissions	20	4.0	365	0.61	5.694	1.19574
2018 Emissions	20	4.0	365	0.61	5.694	1.19574
<b>Montlake Interchange Area</b>						
2012 Emissions	20	8.5	0	0.61	0	0
2013 Emissions	20	8.5	91.25	0.61	3.0249375	0.63523688
2014 Emissions	20	8.5	365	0.61	12.09975	2.5409475
2015 Emissions	20	8.5	365	0.61	12.09975	2.5409475
2016 Emissions	20	8.5	365	0.61	12.09975	2.5409475
2017 Emissions	20	8.5	365	0.61	12.09975	2.5409475



**SR520 Construction Emissions, Site Grading Fugitive Dust Emissions (per Year)**

	<b>PM<sub>10</sub> lb/acre day</b>	<b>Acres Worked</b>	<b>Days Worked</b>	<b>Emissions Reduction Factor- Dust Control</b>	<b>PM<sub>10</sub> Emissions (tpy)</b>	<b>PM<sub>2.5</sub> Emissions (tpy)</b>
2018 Emissions	20	8.5	365	0.61	12.09975	2.5409475
<b>I-5 Interchange Area</b>						
2012 Emissions	20	0.0	0	0.61	0	0
2013 Emissions	20	0.0	0	0.61	0	0
2014 Emissions	20	0.0	0	0.61	0	0
2015 Emissions	20	0.0	0	0.61	0	0
2016 Emissions	20	0.0	182.5	0.61	0	0
2017 Emissions	20	0.0	365	0.61	0	0
2018 Emissions	20	0.0	365	0.61	0	0

Days worked based on construction schedule

EF from URBEMIS 2007 9.2.2

PM2.5 from fugitive dust assumed to be 21% of PM10



**SR520 Construction Emissions, Worker Commute Emissions (Miles per Year)**

Area	Total	Annual Vehicle Miles Traveled						
		2012	2013	2014	2015	2016	2017	2018
Reversible HOV Ramp	226,800	0	0	0	0	45,360	90,720	90,720
On-Westbound Mainline	226,800	0	0	0	0	45,360	90,720	90,720
Roanoke Lid	0	0	0	0	0	0	0	0
Eastbound Mainline and Ramps	302,400	0	0	0	0	60,480	120,960	120,960
10th Avenue/Delmar Lid	570,000	0	0	0	0	114,000	228,000	228,000
Demo Existing 10th/Delmar	113,400	0	0	0	0	22,680	45,360	45,360
Demo Existing Delmar Bridge	113,400	0	0	0	0	22,680	45,360	45,360
Delmar Lid	570,000	0	0	0	0	114,000	228,000	228,000
Demo Temp 10th Avenue Bridge	113,400	0	0	0	0	22,680	45,360	45,360
Portage Bay	3,360,000	0	305,455	610,909	610,909	610,909	610,909	610,909
Mountlake	2,160,000	0	102,857	411,429	411,429	411,429	411,429	411,429
West Approach	3,150,000	0	450,000	600,000	600,000	600,000	600,000	300,000
Floating Bridge	3,510,000	1,002,857	1,002,857	1,002,857	501,429	0	0	0
East Approach	1,417,500	405,000	405,000	405,000	202,500	0	0	0

Total VMT evenly distributed between years based on construction schedule

**SR520 Construction Emissions, Worker Commute Emissions, Summary (g/mi)**

Calendar Year	NOx	CO	SOx	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
2012 Emission Factors	0.857	16.187	0.008	0.921	0.025	0.011
2013 Emission Factors	0.779	15.441	0.008	0.814	0.025	0.011
2014 Emission Factors	0.712	14.767	0.008	0.751	0.025	0.011
2015 Emission Factors	0.655	14.299	0.008	0.699	0.025	0.011
2016 Emission Factors	0.591	13.673	0.008	0.647	0.025	0.011
2017 Emission Factors	0.541	13.323	0.008	0.604	0.025	0.011
2018 Emission Factors	0.484	12.713	0.008	0.558	0.025	0.011

Emission factors from MOBILE6.2

These emission factors represent a weighted average of light duty gas vehicles and light duty gas trucks 1 and 2 with average speed of 45 mph

Miles traveled from WSDOT



**SR520 Construction Emissions, Worker Commute Emissions by Area**

<b>Calendar Year</b>	<b>VMT</b>	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>Sox</b>	<b>VOC</b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>
<b>Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)</b>							
2012 Emissions	1,407,857	1.33	25.12	0.01	1.43	0.04	0.02
2013 Emissions	1,407,857	1.21	23.96	0.01	1.26	0.04	0.02
2014 Emissions	1,407,857	1.10	22.92	0.01	1.17	0.04	0.02
2015 Emissions	703,929	0.51	11.09	0.01	0.54	0.02	0.01
2016 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2017 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2018 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
<b>West Approach Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	450,000	0.39	7.66	0.00	0.40	0.01	0.01
2014 Emissions	600,000	0.47	9.77	0.01	0.50	0.02	0.01
2015 Emissions	600,000	0.43	9.46	0.01	0.46	0.02	0.01
2016 Emissions	600,000	0.39	9.04	0.01	0.43	0.02	0.01
2017 Emissions	600,000	0.36	8.81	0.01	0.40	0.02	0.01
2018 Emissions	300,000	0.16	4.20	0.00	0.18	0.01	0.00
<b>Portage Bay Bridge Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	305,455	0.26	5.20	0.00	0.27	0.01	0.00
2014 Emissions	610,909	0.48	9.94	0.01	0.51	0.02	0.01
2015 Emissions	610,909	0.44	9.63	0.01	0.47	0.02	0.01
2016 Emissions	610,909	0.40	9.21	0.01	0.44	0.02	0.01
2017 Emissions	610,909	0.36	8.97	0.01	0.41	0.02	0.01
2018 Emissions	610,909	0.33	8.56	0.01	0.38	0.02	0.01
<b>Montlake Interchange and Bascule Bridge Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	102,857	0.09	1.75	0.00	0.09	0.00	0.00
2014 Emissions	411,429	0.32	6.70	0.00	0.34	0.01	0.01
2015 Emissions	411,429	0.30	6.48	0.00	0.32	0.01	0.01
2016 Emissions	411,429	0.27	6.20	0.00	0.29	0.01	0.01
2017 Emissions	411,429	0.25	6.04	0.00	0.27	0.01	0.01
2018 Emissions	411,429	0.22	5.77	0.00	0.25	0.01	0.01



**SR520 Construction Emissions, Worker Commute Emissions by Area**

<b>Calendar Year</b>	<b>VMT</b>	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>Sox</b>	<b>VOC</b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>
<b>I-5 Interchange Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2014 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2015 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2016 Emissions	447,240	0.29	6.74	0.00	0.32	0.01	0.01
2017 Emissions	894,480	0.53	13.14	0.01	0.60	0.02	0.01
2018 Emissions	894,480	0.48	12.53	0.01	0.55	0.02	0.01





## SR520 Construction Emissions, On-Road Hauling Emissions (Miles Traveled for Equipment and Year)

	Mobilization Miles Traveled per Day	Reversible HOV Ramp Miles Traveled per Day	On-Westbound Mainline Miles Traveled per Day	Eastbound Mainline and Ramps Miles Traveled	10th Avenue/Delmar Lid Miles Traveled	Demo Existing 10th/Delmar Miles Traveled	Demo Existing Delmar Bridge Miles Traveled	Demo Temp 10th Avenue Bridge Miles Traveled	Portage Bay Miles Traveled	Montlake Miles Traveled	West Approach Miles Traveled	Floating Bridge Miles Traveled	East Approach Miles Traveled
Fill Haul	400	12,600	12,600	12,600	9,500	3,780	3,780	9,500	3,780	60,000	150,000	60,000	32,000
Cement Mixer	200	4,200	4,200	4,200	10,000	0	0	10,000	0	480,000	240,000	360,000	510,000
Material Haul Agg	400	12,600	12,600	12,600	9,500	3,780	3,780	9,500	3,780	60,000	150,000	60,000	32,000
Other	400	7,560	7,560	7,560	11,400	3,780	3,780	11,400	3,780	180,000	150,000	150,000	32,000
Total Miles	1,400	36,960	36,960	36,960	40,400	11,340	11,340	40,400	11,340	780,000	690,000	630,000	724,000
2012 Miles Traveled	0	0	0	0	0	0	0	0	0	0	0	206,857	50,571
2013 Miles Traveled	0	0	0	0	0	0	0	0	70,909	32,857	90,000	206,857	50,571
2014 Miles Traveled	0	0	0	0	0	0	0	0	141,818	131,429	120,000	206,857	50,571
2015 Miles Traveled	0	0	0	0	0	0	0	0	141,818	131,429	120,000	103,429	25,286
2016 Miles Traveled	1,400	7,392	7,392	7,392	8,080	2,268	2,268	8,080	2,268	141,818	131,429	120,000	0
2017 Miles Traveled	0	14,784	14,784	14,784	16,160	4,536	4,536	16,160	4,536	141,818	131,429	120,000	0
2018 Miles Traveled	0	14,784	14,784	14,784	16,160	4,536	4,536	16,160	4,536	141,818	131,429	60,000	0

## SR520 Construction Emissions, On-Road Hauling Emissions Truck Emission Factors (g/mi)

Calendar Year	NOx	CO	SOx	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
2012 Emission Factors	5.648	1.153	0.013	0.281	0.197	0.157
2013 Emission Factors	4.936	0.873	0.013	0.267	0.176	0.139
2014 Emission Factors	4.251	0.755	0.013	0.251	0.149	0.113
2015 Emission Factors	3.706	0.654	0.013	0.235	0.127	0.094
2016 Emission Factors	3.222	0.58	0.013	0.226	0.118	0.085
2017 Emission Factors	2.792	0.516	0.013	0.219	0.110	0.077
2018 Emission Factors	2.351	0.436	0.013	0.210	0.092	0.061

Emission factors from MOBILE6.2 for HDDV 45 mph

Miles traveled from WSDOT



## SR520 Construction Emissions, On-Road Hauling Emissions by Area

Calendar Year	VMT	NOx	CO	Sox	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Evergreen Point Bridge and Eastside Transition Area Emissions (tpy)</b>							
2012 Emissions	257,429	1.60	0.33	0.00	0.08	0.06	0.04
2013 Emissions	257,429	1.40	0.25	0.00	0.08	0.05	0.04
2014 Emissions	257,429	1.21	0.21	0.00	0.07	0.04	0.03
2015 Emissions	128,714	0.53	0.09	0.00	0.03	0.02	0.01
2016 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2017 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2018 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
<b>West Approach Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	90,000	0.49	0.09	0.00	0.03	0.02	0.01
2014 Emissions	120,000	0.56	0.10	0.00	0.03	0.02	0.01
2015 Emissions	120,000	0.49	0.09	0.00	0.03	0.02	0.01
2016 Emissions	120,000	0.43	0.08	0.00	0.03	0.02	0.01
2017 Emissions	120,000	0.37	0.07	0.00	0.03	0.01	0.01
2018 Emissions	60,000	0.16	0.03	0.00	0.01	0.01	0.00
<b>Portage Bay Bridge Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	70,909	0.39	0.07	0.00	0.02	0.01	0.01
2014 Emissions	141,818	0.66	0.12	0.00	0.04	0.02	0.02
2015 Emissions	141,818	0.58	0.10	0.00	0.04	0.02	0.01
2016 Emissions	141,818	0.50	0.09	0.00	0.04	0.02	0.01
2017 Emissions	141,818	0.44	0.08	0.00	0.03	0.02	0.01
2018 Emissions	141,818	0.37	0.07	0.00	0.03	0.01	0.01
<b>Montlake Interchange and Bascule Bridge Area Emissions (tpy)</b>							
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	32,857	0.18	0.03	0.00	0.01	0.01	0.01
2014 Emissions	131,429	0.62	0.11	0.00	0.04	0.02	0.02
2015 Emissions	131,429	0.54	0.09	0.00	0.03	0.02	0.01
2016 Emissions	131,429	0.47	0.08	0.00	0.03	0.02	0.01
2017 Emissions	131,429	0.40	0.07	0.00	0.03	0.02	0.01
2018 Emissions	131,429	0.34	0.06	0.00	0.03	0.01	0.01



## SR520 Construction Emissions, On-Road Hauling Emissions by Area

Calendar Year	VMT	NOx	CO	Sox	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>I-5 Interchange Area Emissions (tpy)</b>							
Calendar Year	VMT	NOx	CO	Sox	VOC	PM10	PM2.5
2012 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2013 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2014 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2015 Emissions	0	0.00	0.00	0.00	0.00	0.00	0.00
2016 Emissions	46,540	0.17	0.03	0.00	0.01	0.01	0.00
2017 Emissions	90,280	0.28	0.05	0.00	0.02	0.01	0.01
2018 Emissions	90,280	0.23	0.04	0.00	0.02	0.01	0.01





## **Attachment 2C**

### **WASIST Intersection Data**



# Washington State Intersection Screening Tool 1.0

12-01-10  
10:35 AM  
Westside SR 520

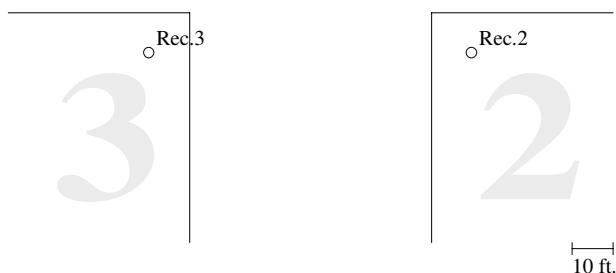
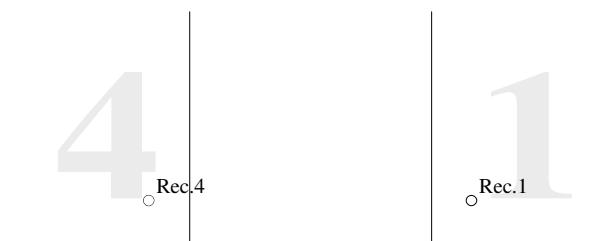
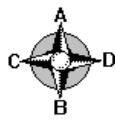


Description: **15th and Pacific - 2018 Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.5	1.8	Pass
2	2	10	10	2.1	1.5	Pass
3	3	10	10	2.3	1.6	Pass
4	4	10	10	2.3	1.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

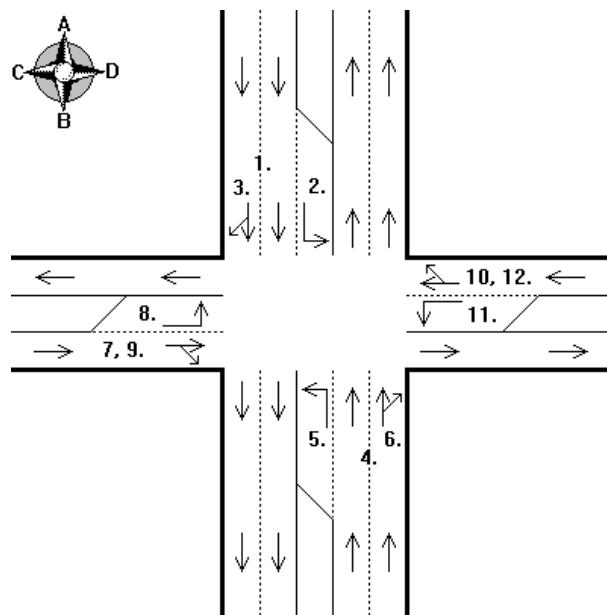
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	790
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	580
5	B-C Left Turn	70
6	B-D Right Turn	290
7	C-D Thru	150
8	C-A Left Turn	60
9	C-B Right Turn	340
10	D-C Thru	90
11	D-B Left Turn	690
12	D-A Right Turn	60



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	11.35
Leg B	30	11.35
Leg C	30	11.35
Leg D	30	11.35

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	81
Leg A Left Turn	106
Leg B Thru & Rt	84
Leg B Left Turn	109
Leg C Thru & Rt	90
Leg C Left Turn	90
Leg D Thru & Rt	80
Leg D Left Turn	80

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:39 AM  
Westside SR 520

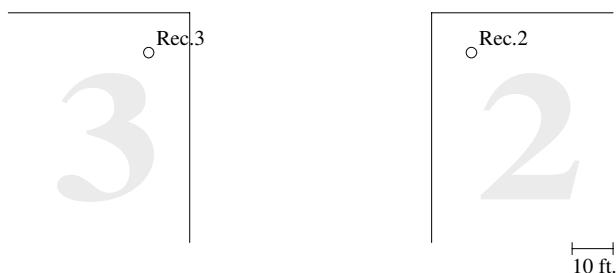
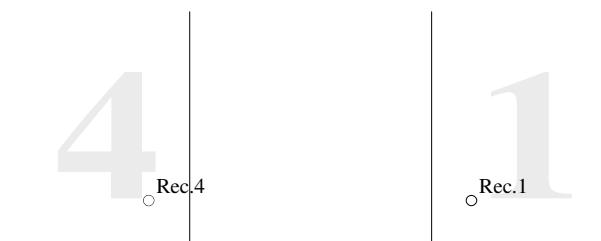
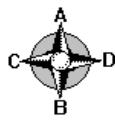


Description: **15th and Pacific - 2030 Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.4	1.7	Pass
2	2	10	10	1.9	1.3	Pass
3	3	10	10	2.1	1.5	Pass
4	4	10	10	2.1	1.5	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

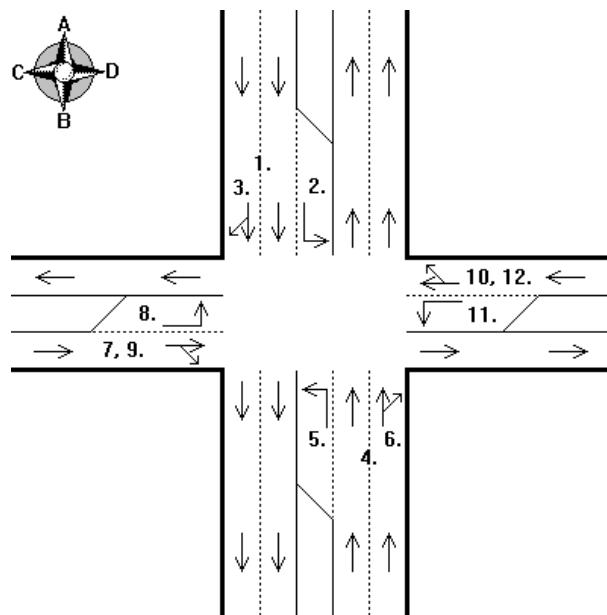
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	870
2	A-D Left Turn	90
3	A-C Right Turn	20
4	B-A Thru	660
5	B-C Left Turn	80
6	B-D Right Turn	320
7	C-D Thru	170
8	C-A Left Turn	60
9	C-B Right Turn	390
10	D-C Thru	100
11	D-B Left Turn	760
12	D-A Right Turn	60



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	9.55
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	84
Leg A Left Turn	106
Leg B Thru & Rt	81
Leg B Left Turn	102
Leg C Thru & Rt	93
Leg C Left Turn	93
Leg D Thru & Rt	81
Leg D Left Turn	81

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:54 AM  
Westside SR 520

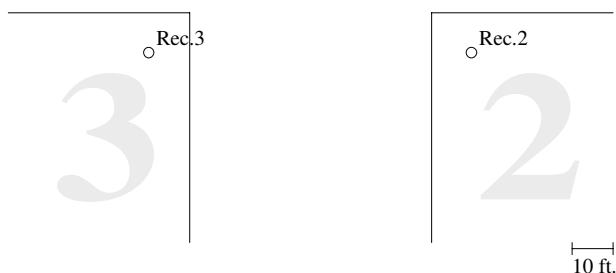
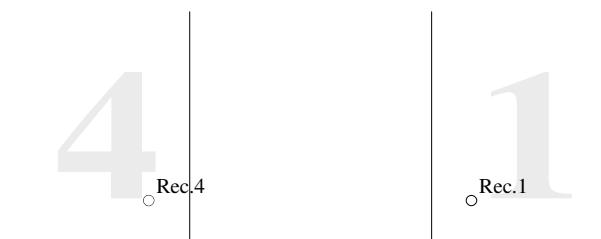
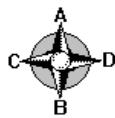


Description: **15th and Pacific - 2040 Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.5	1.8	Pass
2	2	10	10	2.0	1.4	Pass
3	3	10	10	2.2	1.5	Pass
4	4	10	10	2.1	1.5	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

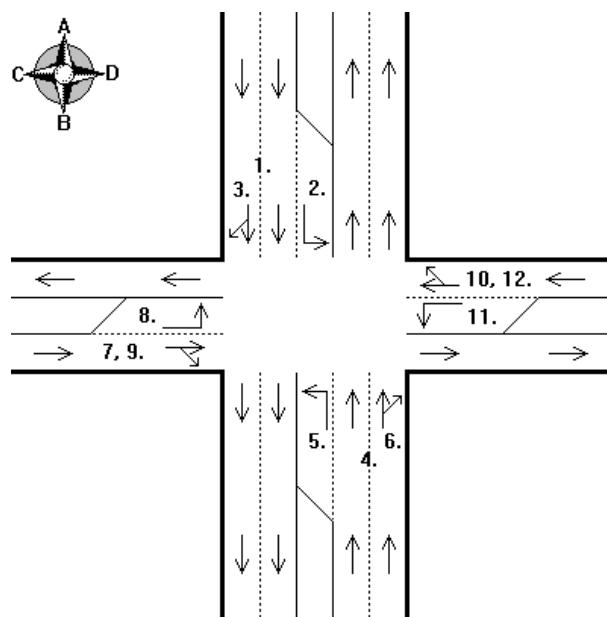
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	906
2	A-D Left Turn	94
3	A-C Right Turn	21
4	B-A Thru	687
5	B-C Left Turn	83
6	B-D Right Turn	333
7	C-D Thru	177
8	C-A Left Turn	63
9	C-B Right Turn	406
10	D-C Thru	104
11	D-B Left Turn	791
12	D-A Right Turn	63



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	9.53
Leg B	30	9.53
Leg C	30	9.53
Leg D	30	9.53

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	84
Leg A Left Turn	106
Leg B Thru & Rt	81
Leg B Left Turn	102
Leg C Thru & Rt	93
Leg C Left Turn	93
Leg D Thru & Rt	81
Leg D Left Turn	81

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10

10:07 AM

Westside SR 520



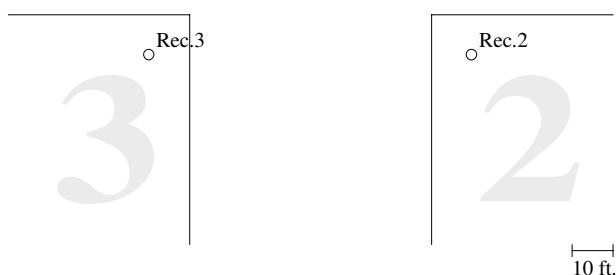
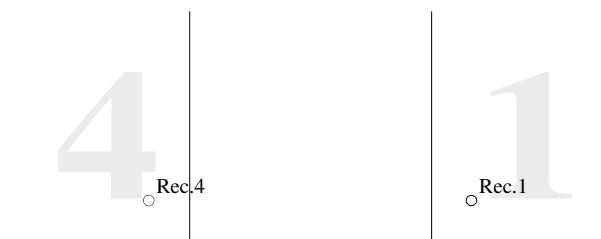
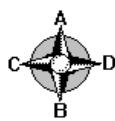
Description: **15th and Pacific - 2008 EX**

Performed by: **Ben Beattie - CH2M HILL**

- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.4	3.1	Pass
2	2	10	10	3.7	2.6	Pass
3	3	10	10	3.7	2.6	Pass
4	4	10	10	3.7	2.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

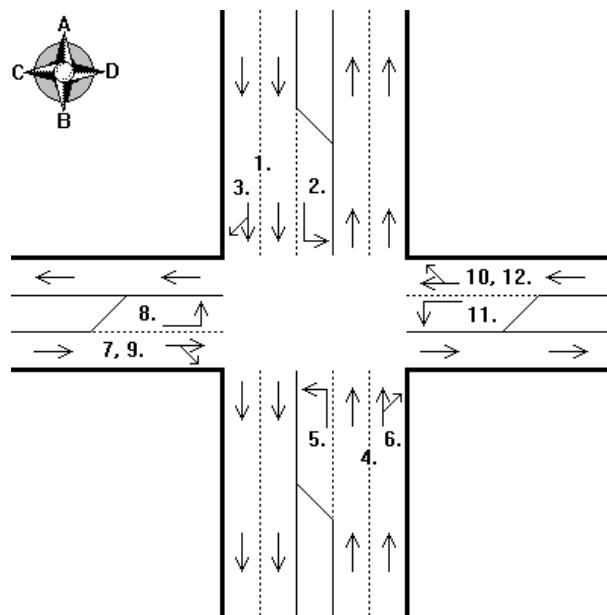
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	690
2	A-D Left Turn	70
3	A-C Right Turn	20
4	B-A Thru	540
5	B-C Left Turn	70
6	B-D Right Turn	270
7	C-D Thru	140
8	C-A Left Turn	50
9	C-B Right Turn	310
10	D-C Thru	80
11	D-B Left Turn	610
12	D-A Right Turn	50



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2008**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	18.80
Leg B	30	18.80
Leg C	30	18.80
Leg D	30	18.80

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **100**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	73
Leg A Left Turn	88
Leg B Thru & Rt	73
Leg B Left Turn	88
Leg C Thru & Rt	67
Leg C Left Turn	67
Leg D Thru & Rt	72
Leg D Left Turn	72

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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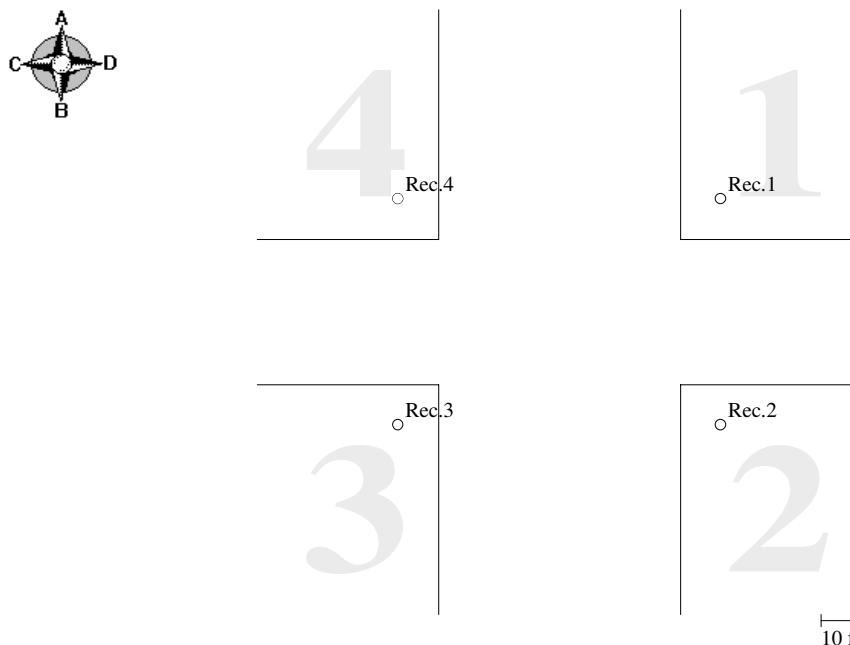
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# Washington State Intersection Screening Tool 1.0

12-01-10  
10:40 AM  
Westside SR 520



Description: **15th and Pacific - 2018 NB**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.5	1.8	Pass
2	2	10	10	2.1	1.5	Pass
3	3	10	10	2.2	1.5	Pass
4	4	10	10	2.2	1.5	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

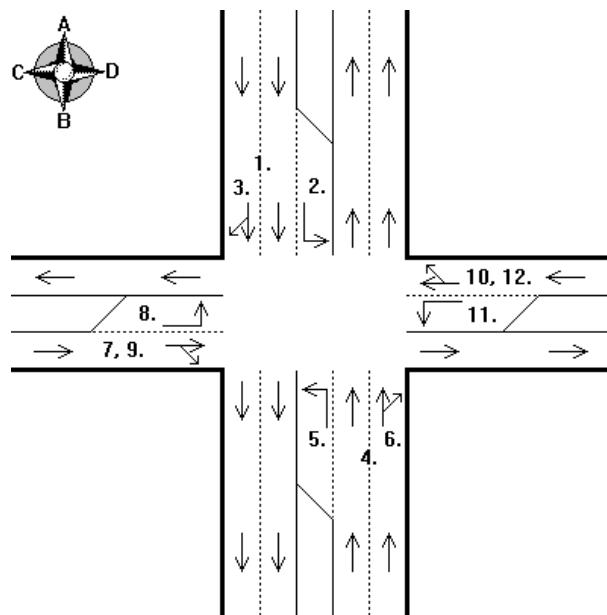
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	750
2	A-D Left Turn	80
3	A-C Right Turn	20
4	B-A Thru	580
5	B-C Left Turn	70
6	B-D Right Turn	290
7	C-D Thru	150
8	C-A Left Turn	60
9	C-B Right Turn	340
10	D-C Thru	90
11	D-B Left Turn	690
12	D-A Right Turn	60



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	11.35
Leg B	30	11.35
Leg C	30	11.35
Leg D	30	11.35

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	82
Leg A Left Turn	106
Leg B Thru & Rt	84
Leg B Left Turn	108
Leg C Thru & Rt	90
Leg C Left Turn	90
Leg D Thru & Rt	80
Leg D Left Turn	80

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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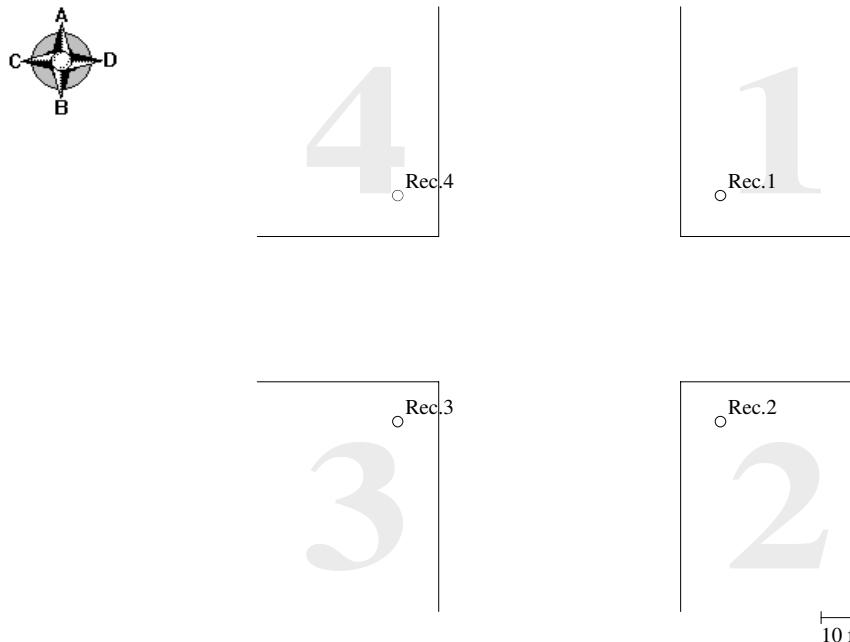
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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:41 AM  
Westside SR 520



Description: **15th and Pacific - 2030 NB**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.5	1.8	Pass
2	2	10	10	2.0	1.4	Pass
3	3	10	10	2.0	1.4	Pass
4	4	10	10	2.0	1.4	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

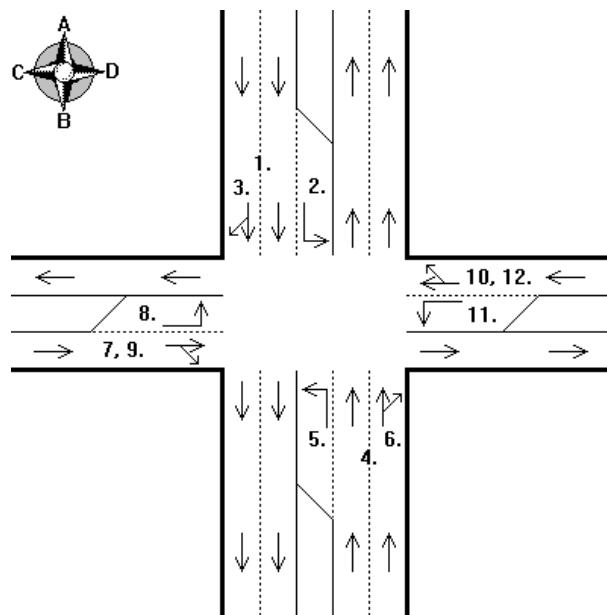
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	830
2	A-D Left Turn	90
3	A-C Right Turn	20
4	B-A Thru	650
5	B-C Left Turn	80
6	B-D Right Turn	320
7	C-D Thru	170
8	C-A Left Turn	60
9	C-B Right Turn	370
10	D-C Thru	100
11	D-B Left Turn	730
12	D-A Right Turn	60



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	9.55
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	81
Leg A Left Turn	106
Leg B Thru & Rt	83
Leg B Left Turn	108
Leg C Thru & Rt	93
Leg C Left Turn	93
Leg D Thru & Rt	79
Leg D Left Turn	79

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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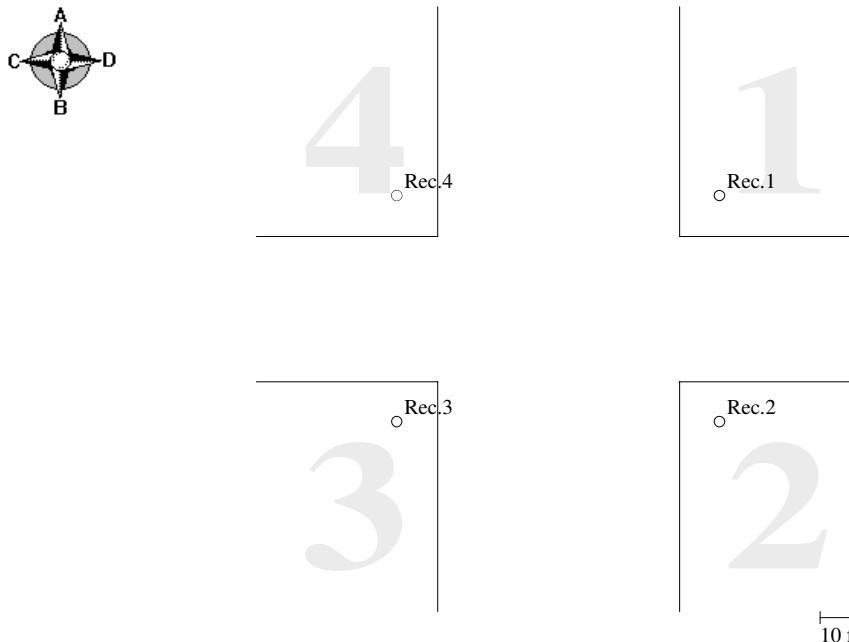
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:01 AM  
Westside SR 520



Description: **15th and Pacific - 2040 NB**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Pacific Street C-D: 15th Avenue NE**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.5	1.8	Pass
2	2	10	10	2.0	1.4	Pass
3	3	10	10	2.0	1.4	Pass
4	4	10	10	2.1	1.5	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

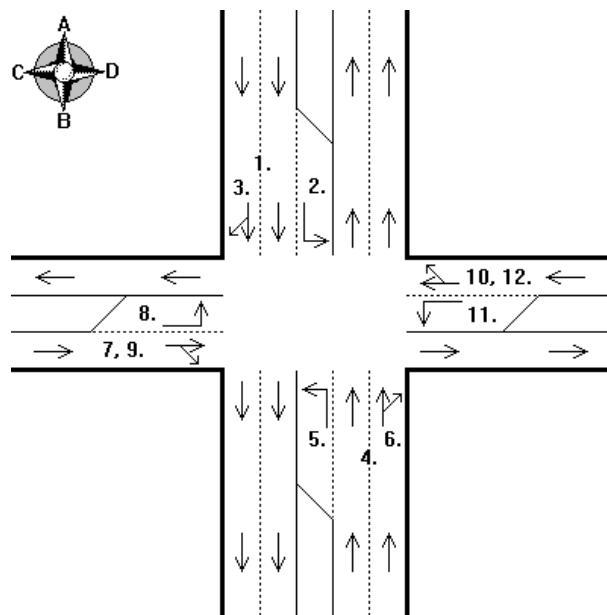
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	864
2	A-D Left Turn	94
3	A-C Right Turn	21
4	B-A Thru	677
5	B-C Left Turn	83
6	B-D Right Turn	333
7	C-D Thru	177
8	C-A Left Turn	63
9	C-B Right Turn	385
10	D-C Thru	104
11	D-B Left Turn	760
12	D-A Right Turn	63



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	30	9.53
Leg B	30	9.53
Leg C	30	9.53
Leg D	30	9.53

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	81
Leg A Left Turn	106
Leg B Thru & Rt	83
Leg B Left Turn	108
Leg C Thru & Rt	93
Leg C Left Turn	93
Leg D Thru & Rt	79
Leg D Left Turn	79

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-02-10  
11:52 AM  
Westside SR 520

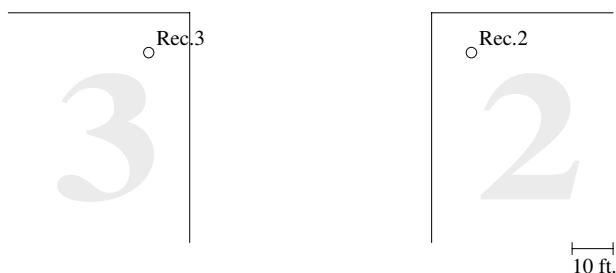
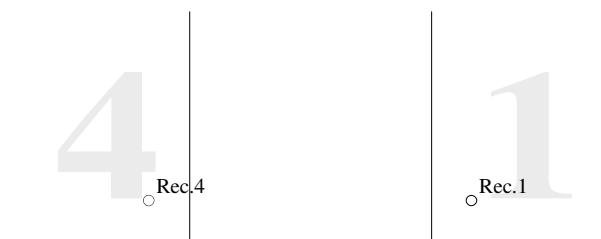
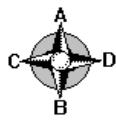


Description: **Montlake and Pacific Place - 2018 Pref. Alt**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.0	2.1	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.6	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

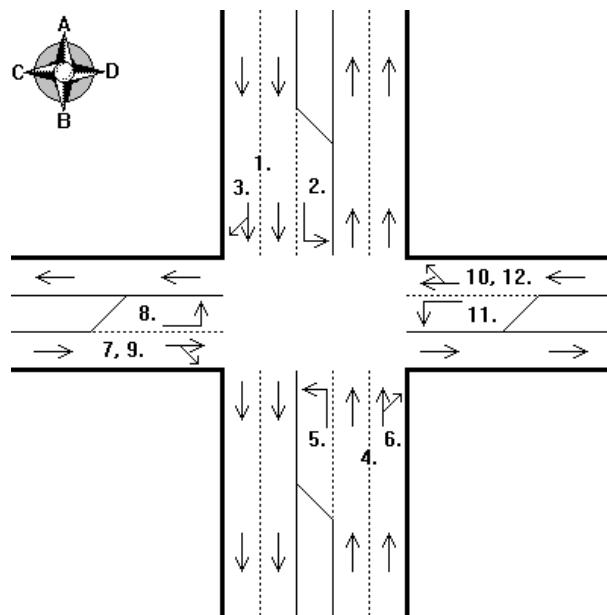
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1640
2	A-D Left Turn	2
3	A-C Right Turn	140
4	B-A Thru	2080
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	30
8	C-A Left Turn	590
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	260
12	D-A Right Turn	90



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>11.35</b>
<b>Leg B</b>	<b>30</b>	<b>11.35</b>
<b>Leg C</b>	<b>25</b>	<b>11.54</b>
<b>Leg D</b>	<b>25</b>	<b>11.54</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>40</b>
<b>Leg A Left Turn</b>	<b>40</b>
<b>Leg B Thru &amp; Rt</b>	<b>40</b>
<b>Leg B Left Turn</b>	<b>40</b>
<b>Leg C Thru &amp; Rt</b>	<b>80</b>
<b>Leg C Left Turn</b>	<b>80</b>
<b>Leg D Thru &amp; Rt</b>	<b>80</b>
<b>Leg D Left Turn</b>	<b>80</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:48 AM  
Westside SR 520

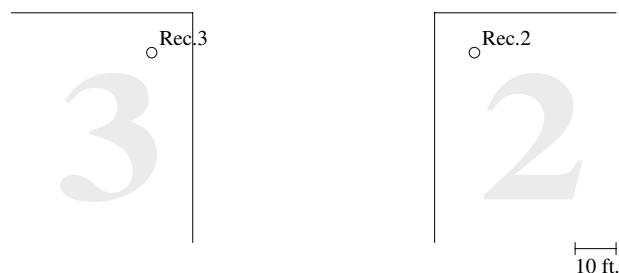
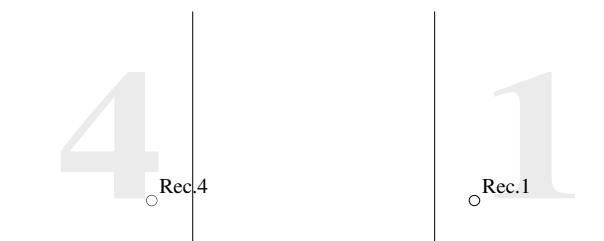
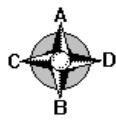


Description: **Montlake and Pacific Place - 2030 Pref. Alt**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	2.6	1.8	Pass
4	4	10	10	2.5	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

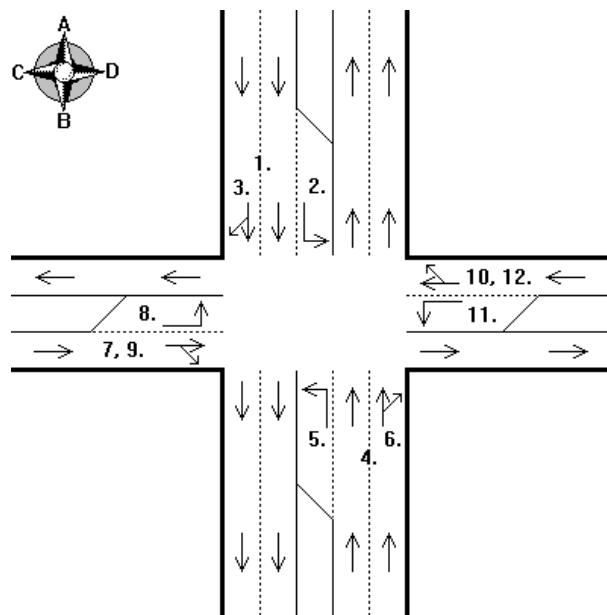
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1800
2	A-D Left Turn	2
3	A-C Right Turn	160
4	B-A Thru	2360
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	40
8	C-A Left Turn	650
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	300
12	D-A Right Turn	100



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.54
Leg B	30	9.55
Leg C	25	9.71
Leg D	25	9.71

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	41
Leg A Left Turn	41
Leg B Thru & Rt	41
Leg B Left Turn	41
Leg C Thru & Rt	79
Leg C Left Turn	79
Leg D Thru & Rt	79
Leg D Left Turn	79

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10

12:01 PM

Westside SR 520



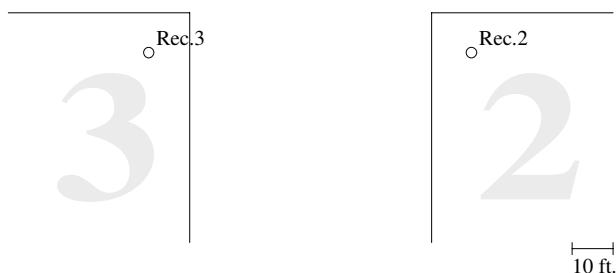
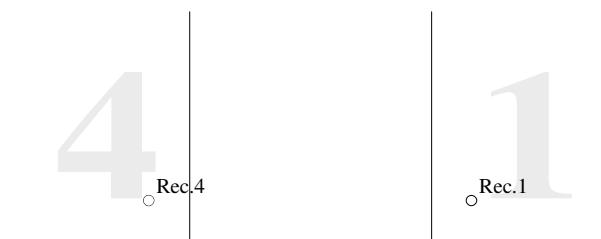
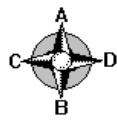
Description: **Montlake and Pacific Place - 2040 Pref. Alt**

Performed by: **Ben Beattie - CH2M HILL**

- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	2.8	2.0	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.6	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

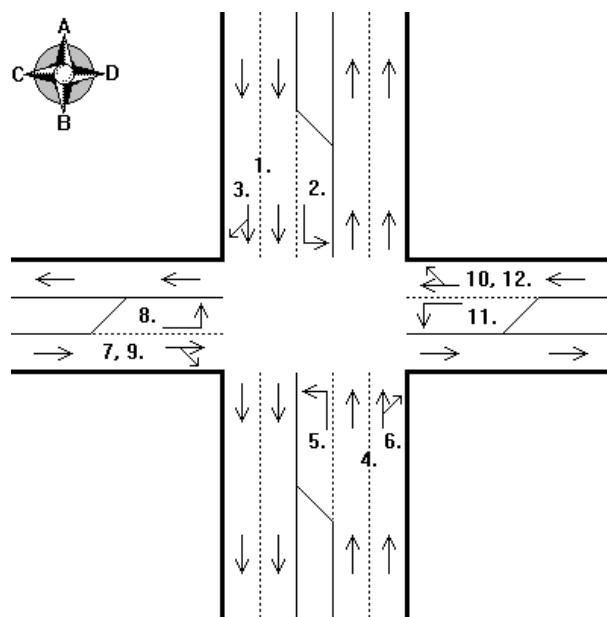
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1874
2	A-D Left Turn	2
3	A-C Right Turn	167
4	B-A Thru	2457
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	42
8	C-A Left Turn	677
9	C-B Right Turn	62
10	D-C Thru	2
11	D-B Left Turn	312
12	D-A Right Turn	104



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.53
Leg B	30	9.53
Leg C	25	9.69
Leg D	25	9.69

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	41
Leg A Left Turn	41
Leg B Thru & Rt	41
Leg B Left Turn	41
Leg C Thru & Rt	79
Leg C Left Turn	79
Leg D Thru & Rt	79
Leg D Left Turn	79

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:20 AM  
Westside SR 520

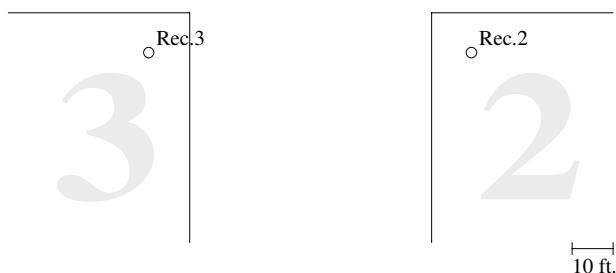
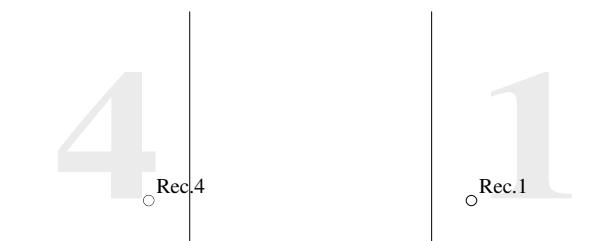
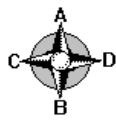


Description: **Montlake and Pacific Place - 2008 EX**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.7	3.3	Pass
2	2	10	10	4.2	2.9	Pass
3	3	10	10	4.7	3.3	Pass
4	4	10	10	3.9	2.7	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

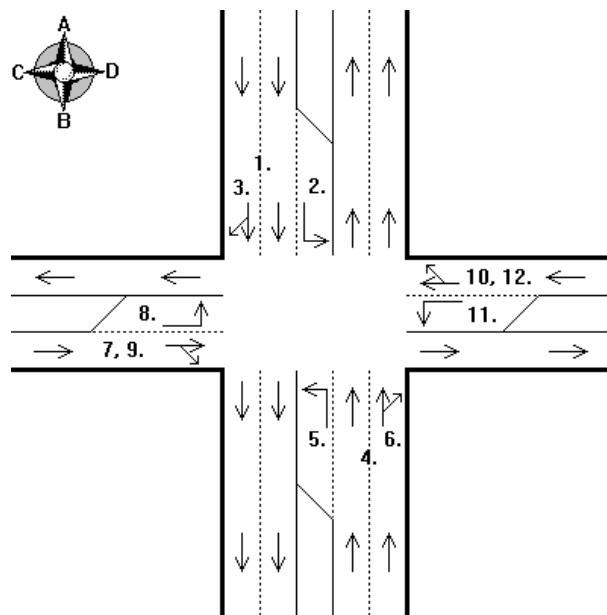
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1390
2	A-D Left Turn	2
3	A-C Right Turn	130
4	B-A Thru	1910
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	30
8	C-A Left Turn	540
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	240
12	D-A Right Turn	80



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2008**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	18.79
Leg B	30	18.80
Leg C	25	19.17
Leg D	25	19.17

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	48
Leg A Left Turn	48
Leg B Thru & Rt	48
Leg B Left Turn	48
Leg C Thru & Rt	72
Leg C Left Turn	72
Leg D Thru & Rt	72
Leg D Left Turn	72

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10  
01:22 PM  
Westside SR 520

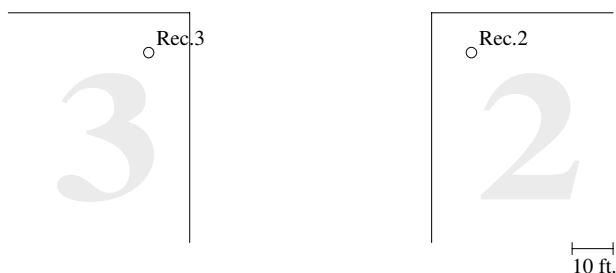
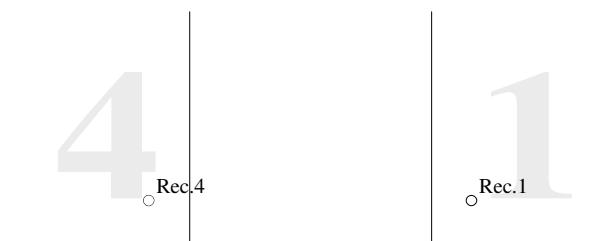
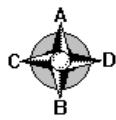


Description: **Montlake and Pacific Place - 2018 NB**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	2.8	2.0	Pass
4	4	10	10	2.6	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

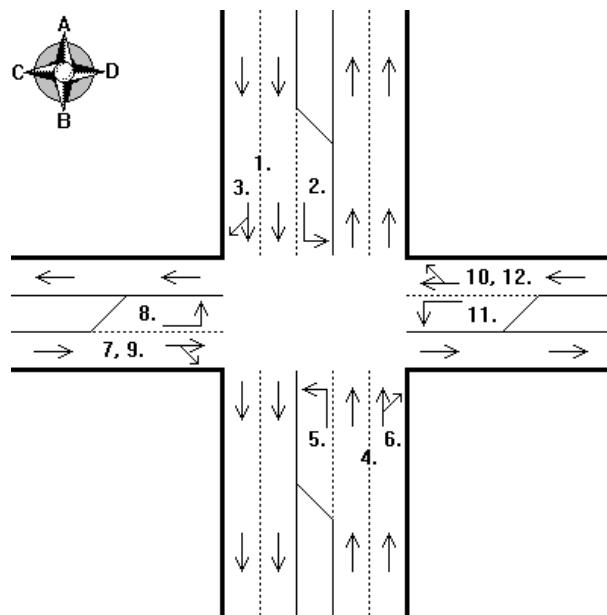
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1530
2	A-D Left Turn	2
3	A-C Right Turn	140
4	B-A Thru	2070
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	30
8	C-A Left Turn	590
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	260
12	D-A Right Turn	90



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	11.35
Leg B	30	11.35
Leg C	25	11.54
Leg D	25	11.54

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	40
Leg A Left Turn	40
Leg B Thru & Rt	40
Leg B Left Turn	40
Leg C Thru & Rt	80
Leg C Left Turn	80
Leg D Thru & Rt	80
Leg D Left Turn	80

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:50 AM  
Westside SR 520



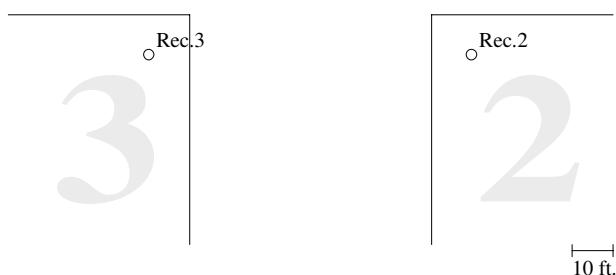
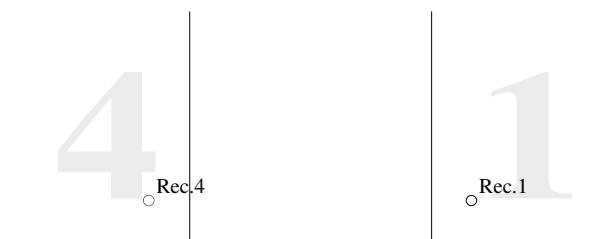
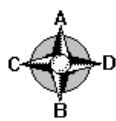
Description: **Montlake and Pacific Place - 2040 NB**

Performed by: **Ben Beattie - CH2M HILL**

- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.4	1.7	Pass
3	3	10	10	2.7	1.9	Pass
4	4	10	10	2.5	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

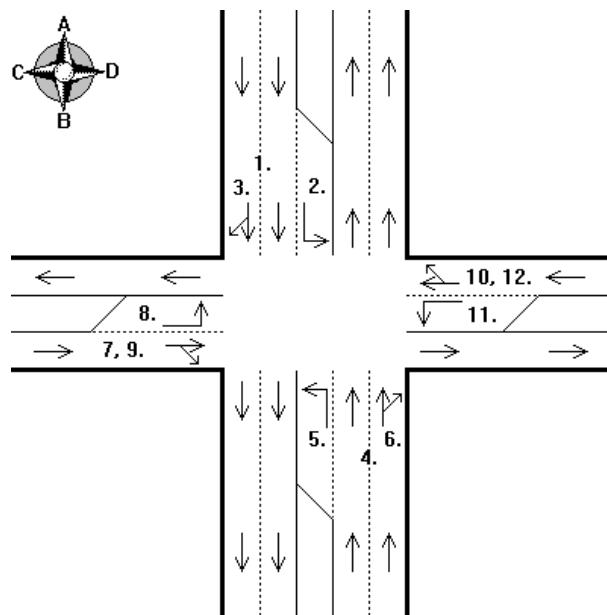
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1670
2	A-D Left Turn	2
3	A-C Right Turn	160
4	B-A Thru	2320
5	B-C Left Turn	2
6	B-D Right Turn	10
7	C-D Thru	100
8	C-A Left Turn	650
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	280
12	D-A Right Turn	100



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.53
Leg B	30	9.53
Leg C	25	9.69
Leg D	25	9.69

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	40
Leg A Left Turn	40
Leg B Thru & Rt	40
Leg B Left Turn	40
Leg C Thru & Rt	80
Leg C Left Turn	80
Leg D Thru & Rt	80
Leg D Left Turn	80

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:13 AM  
Westside SR 520



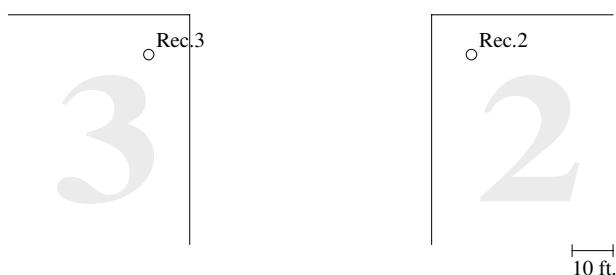
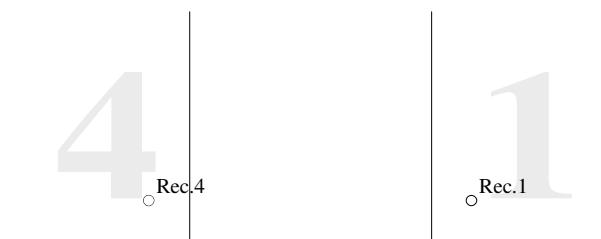
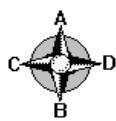
Description: **Montlake and Pacific Place - 2040 NB**

Performed by: **Ben Beattie - CH2M HILL**

- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake C-D: Pacific Place**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.8	2.0	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	2.7	1.9	Pass
4	4	10	10	2.5	1.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

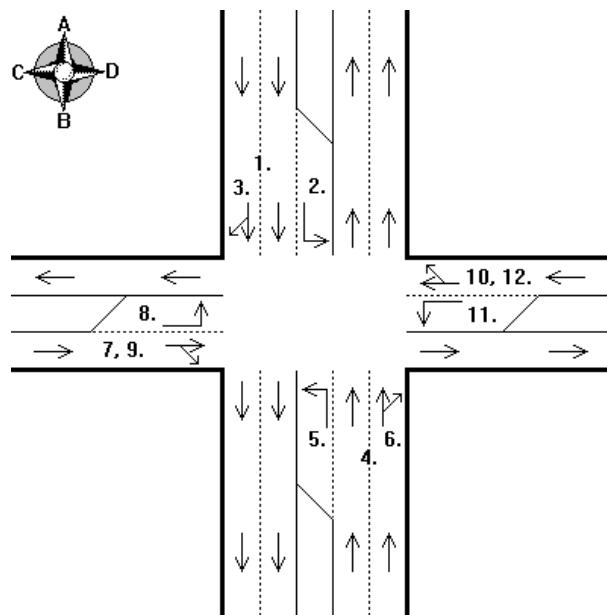
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1738
2	A-D Left Turn	2
3	A-C Right Turn	167
4	B-A Thru	2415
5	B-C Left Turn	10
6	B-D Right Turn	2
7	C-D Thru	42
8	C-A Left Turn	677
9	C-B Right Turn	62
10	D-C Thru	2
11	D-B Left Turn	291
12	D-A Right Turn	104



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.53
Leg B	30	9.53
Leg C	25	9.69
Leg D	25	9.69

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	40
Leg A Left Turn	40
Leg B Thru & Rt	40
Leg B Left Turn	40
Leg C Thru & Rt	80
Leg C Left Turn	80
Leg D Thru & Rt	80
Leg D Left Turn	80

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10  
01:28 PM  
Westside SR 520

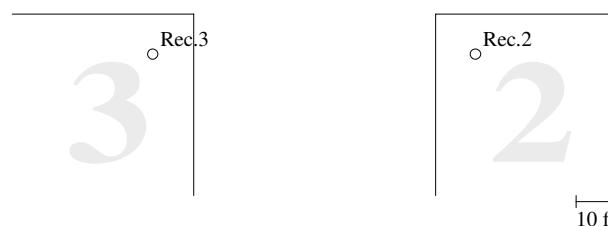
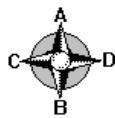


Description: **Montlake and Pacific Street - 2018 Preferred Alternative**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.0	2.1	Pass
2	2	10	10	3.0	2.1	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>3.6</u>	<u>2.5</u>	<u>Pass</u>
4	4	10	10	3.6	2.5	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

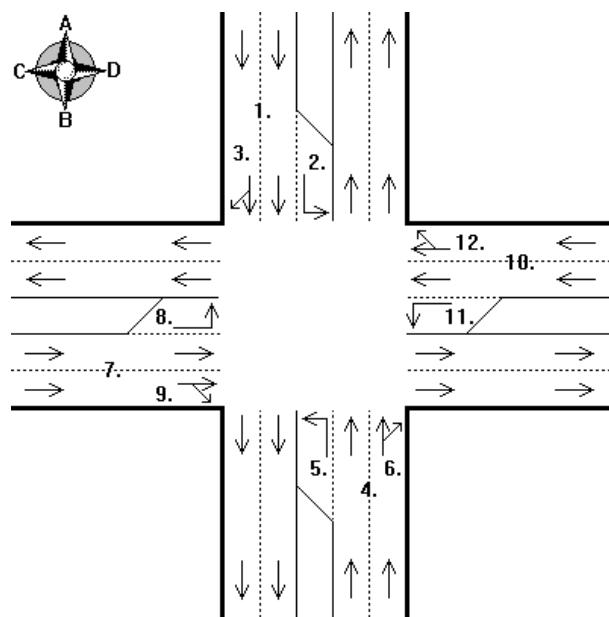
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1850
2	A-D Left Turn	10
3	A-C Right Turn	120
4	B-A Thru	2060
5	B-C Left Turn	680
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1120
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	40



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>11.35</b>
<b>Leg B</b>	<b>30</b>	<b>11.35</b>
<b>Leg C</b>	<b>30</b>	<b>11.35</b>
<b>Leg D</b>	<b>30</b>	<b>11.35</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>50</b>
<b>Leg A Left Turn</b>	<b>50</b>
<b>Leg B Thru &amp; Rt</b>	<b>26</b>
<b>Leg B Left Turn</b>	<b>70</b>
<b>Leg C Thru &amp; Rt</b>	<b>70</b>
<b>Leg C Left Turn</b>	<b>70</b>
<b>Leg D Thru &amp; Rt</b>	<b>70</b>
<b>Leg D Left Turn</b>	<b>70</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:51 AM  
Westside SR 520

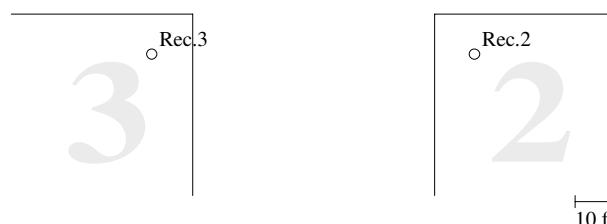
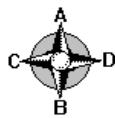


Description: **Montlake and Pacific Street - 2040 No Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	2.8	2.0	Pass
3	3	10	10	3.3	2.3	Pass
<u>4</u>	<u>4</u>	<u>10</u>	<u>10</u>	<u>3.4</u>	<u>2.4</u>	<u>Pass</u>

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 4**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

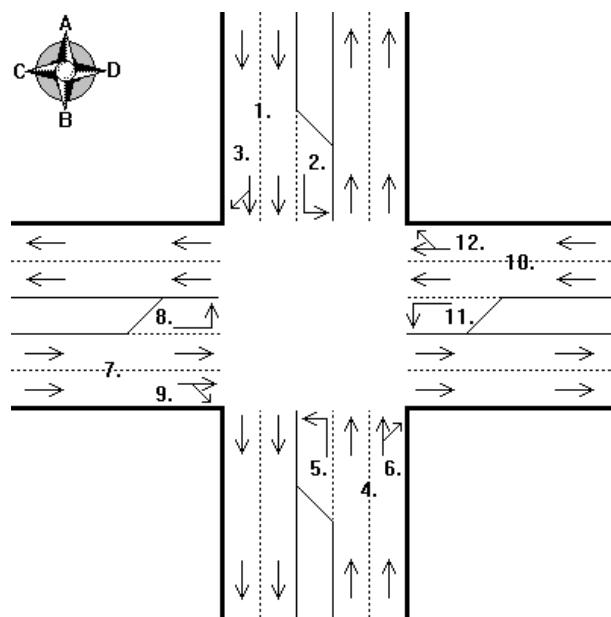
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2040
2	A-D Left Turn	10
3	A-C Right Turn	130
4	B-A Thru	2330
5	B-C Left Turn	760
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1240
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	50



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.53
Leg B	30	9.53
Leg C	30	9.53
Leg D	30	9.53

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	50
Leg A Left Turn	50
Leg B Thru & Rt	26
Leg B Left Turn	70
Leg C Thru & Rt	70
Leg C Left Turn	70
Leg D Thru & Rt	70
Leg D Left Turn	70

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
12:03 PM  
Westside SR 520

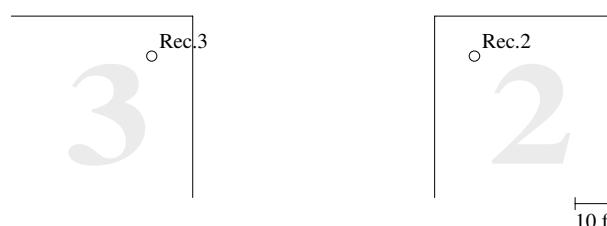
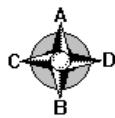


Description: **Montlake and Pacific Street - 2040 Pref. Alt.**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



10 ft.

## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.0	2.1	Pass
2	2	10	10	2.9	2.0	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>3.5</u>	<u>2.4</u>	<u>Pass</u>
4	4	10	10	3.4	2.4	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

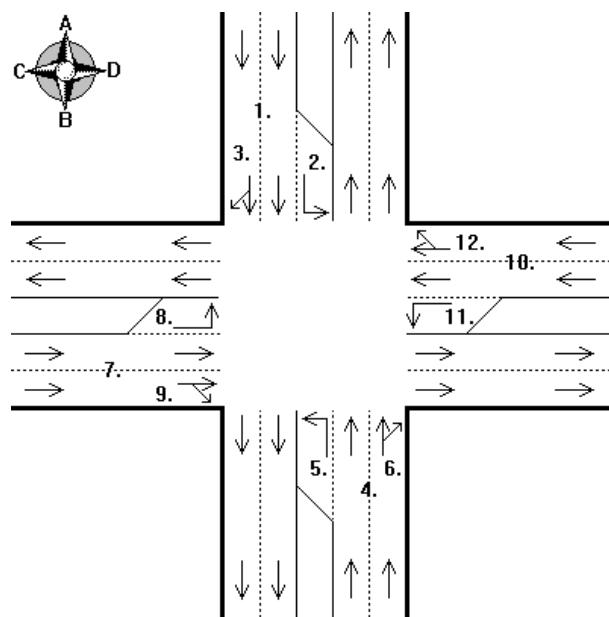
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2124
2	A-D Left Turn	10
3	A-C Right Turn	135
4	B-A Thru	2426
5	B-C Left Turn	791
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1291
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	52



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.09**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.53
Leg B	30	9.53
Leg C	30	9.53
Leg D	30	9.53

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	50
Leg A Left Turn	50
Leg B Thru & Rt	26
Leg B Left Turn	70
Leg C Thru & Rt	70
Leg C Left Turn	70
Leg D Thru & Rt	70
Leg D Left Turn	70

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:26 AM  
Westside SR 520

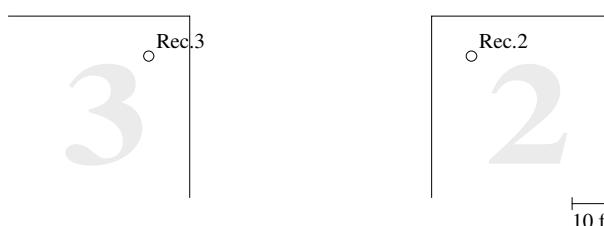
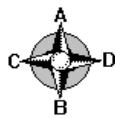


Description: **Montlake and Pacific Street - 2008 EX**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.7	3.3	Pass
2	2	10	10	4.7	3.3	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>5.2</u>	<u>3.6</u>	<u>Pass</u>
4	4	10	10	5.2	3.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

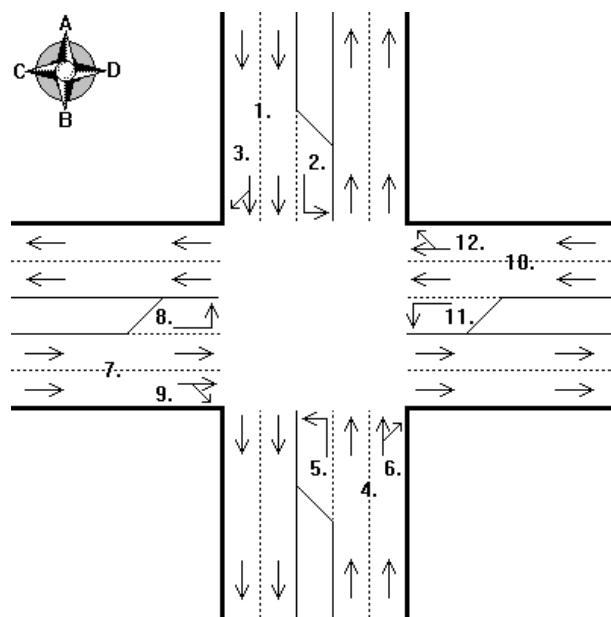
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1570
2	A-D Left Turn	10
3	A-C Right Turn	110
4	B-A Thru	1890
5	B-C Left Turn	620
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	960
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	40



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2008**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **120.19**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>18.79</b>
<b>Leg B</b>	<b>30</b>	<b>18.80</b>
<b>Leg C</b>	<b>30</b>	<b>18.80</b>
<b>Leg D</b>	<b>30</b>	<b>18.80</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>45</b>
<b>Leg A Left Turn</b>	<b>45</b>
<b>Leg B Thru &amp; Rt</b>	<b>27</b>
<b>Leg B Left Turn</b>	<b>75</b>
<b>Leg C Thru &amp; Rt</b>	<b>66</b>
<b>Leg C Left Turn</b>	<b>66</b>
<b>Leg D Thru &amp; Rt</b>	<b>66</b>
<b>Leg D Left Turn</b>	<b>66</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10  
01:30 PM  
Westside SR 520

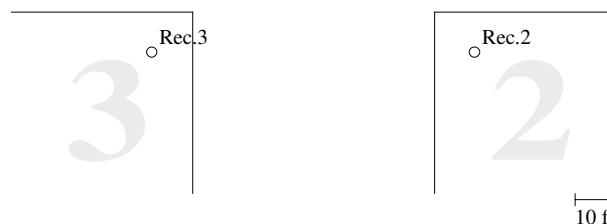
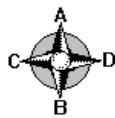


Description: **Montlake and Pacific Street - 2018 No Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.7	1.9	Pass
2	2	10	10	2.8	2.0	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>3.4</u>	<u>2.4</u>	<u>Pass</u>
4	4	10	10	3.4	2.4	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

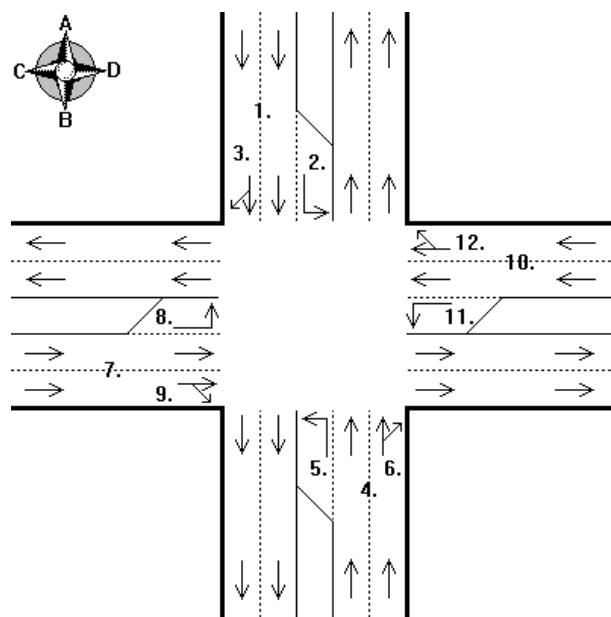
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1730
2	A-D Left Turn	10
3	A-C Right Turn	120
4	B-A Thru	2050
5	B-C Left Turn	680
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1060
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	40



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **67.98**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	11.35
Leg B	30	11.35
Leg C	30	11.35
Leg D	30	11.35

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	54
Leg A Left Turn	54
Leg B Thru & Rt	26
Leg B Left Turn	66
Leg C Thru & Rt	54
Leg C Left Turn	54
Leg D Thru & Rt	1
Leg D Left Turn	1

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:55 AM  
Westside SR 520

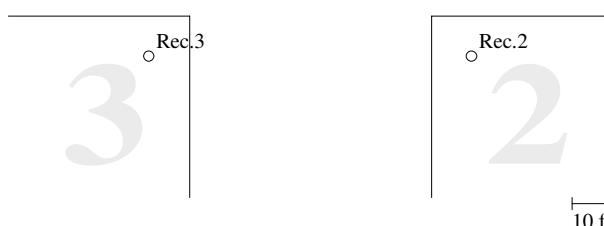
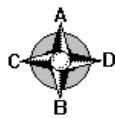


Description: **Montlake and Pacific Street - 2030 No Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.6	1.8	Pass
2	2	10	10	2.7	1.9	Pass
3	3	10	10	3.1	2.2	Pass
<u>4</u>	<u>4</u>	<u>10</u>	<u>10</u>	<u>3.3</u>	<u>2.3</u>	<u>Pass</u>

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 4**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

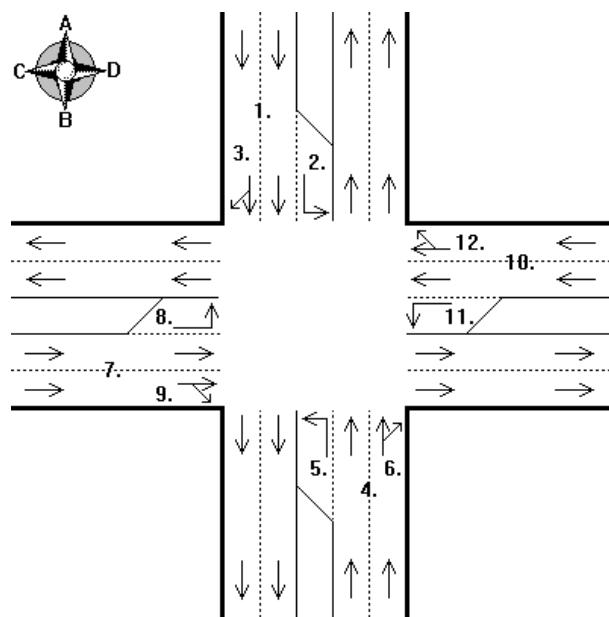
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1890
2	A-D Left Turn	10
3	A-C Right Turn	130
4	B-A Thru	2300
5	B-C Left Turn	760
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1150
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	50



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.54
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	54
Leg A Left Turn	54
Leg B Thru & Rt	26
Leg B Left Turn	66
Leg C Thru & Rt	54
Leg C Left Turn	54
Leg D Thru & Rt	1
Leg D Left Turn	1

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:18 AM  
Westside SR 520

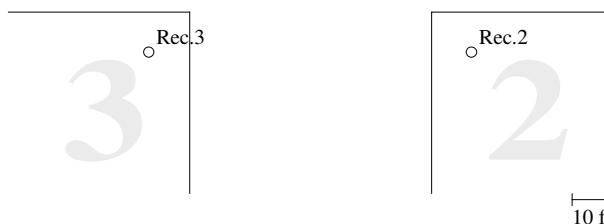
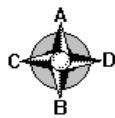


Description: **Montlake and Pacific Street - 2030 No Build**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 4 w/4 Lt Turns**

Street Names: **A-B: Pacific Street C-D: Montlake**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	2.9	2.0	Pass
2	2	10	10	2.8	2.0	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>3.3</u>	<u>2.3</u>	<u>Pass</u>
4	4	10	10	3.3	2.3	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

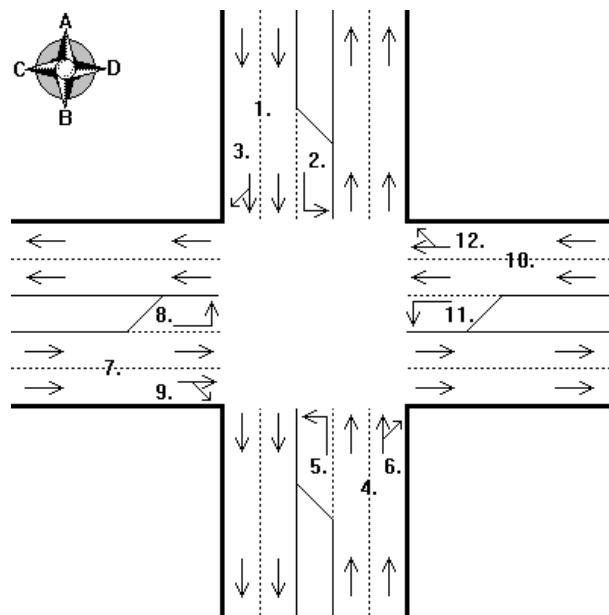
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1967
2	A-D Left Turn	10
3	A-C Right Turn	135
4	B-A Thru	2394
5	B-C Left Turn	791
6	B-D Right Turn	10
7	C-D Thru	2
8	C-A Left Turn	2
9	C-B Right Turn	1197
10	D-C Thru	2
11	D-B Left Turn	2
12	D-A Right Turn	52



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **Yes**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **57.24**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	9.54
Leg B	30	9.55
Leg C	30	9.55
Leg D	30	9.55

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	54
Leg A Left Turn	54
Leg B Thru & Rt	26
Leg B Left Turn	66
Leg C Thru & Rt	71
Leg C Left Turn	71
Leg D Thru & Rt	61
Leg D Left Turn	61

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10

01:34 PM

Westside SR 520



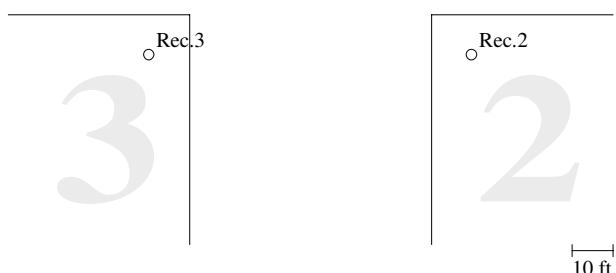
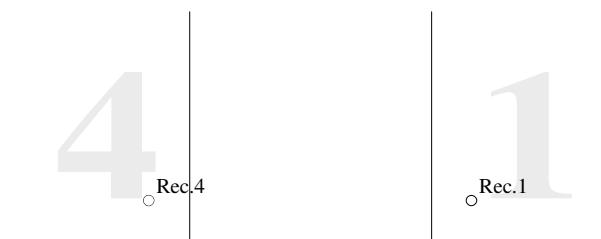
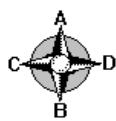
Description: **Montlake & Shelby B2018 Preferred Alternative**

Performed by: **Ben Beattie - CH2M HILL**

- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.0	2.8	Pass
2	2	10	10	3.7	2.6	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.4</u>	<u>3.1</u>	<u>Pass</u>
4	4	10	10	3.9	2.7	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

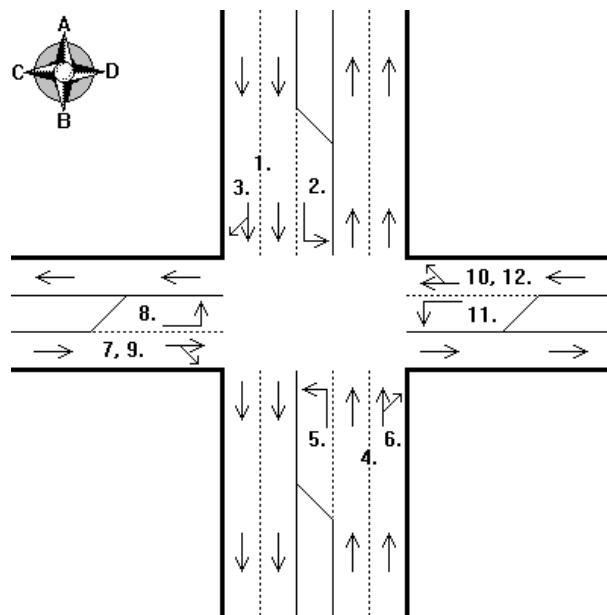
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2960
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	2690
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	60
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	20
12	D-A Right Turn	20



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **91.40**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	13.74
Leg B	35	13.74
Leg C	30	13.75
Leg D	30	13.75

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	25
Leg A Left Turn	25
Leg B Thru & Rt	25
Leg B Left Turn	25
Leg C Thru & Rt	95
Leg C Left Turn	95
Leg D Thru & Rt	95
Leg D Left Turn	95

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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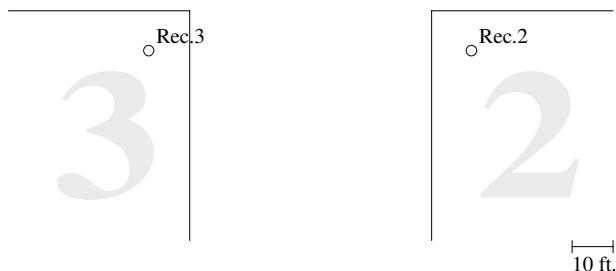
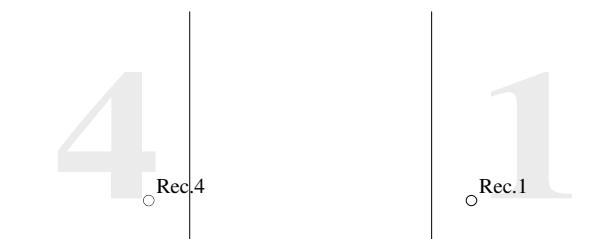
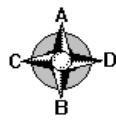
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:46 AM  
Westside SR 520



Description: **Montlake & Shelby B2030**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.9	2.7	Pass
2	2	10	10	3.7	2.6	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.0</u>	<u>2.8</u>	<u>Pass</u>
4	4	10	10	3.7	2.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

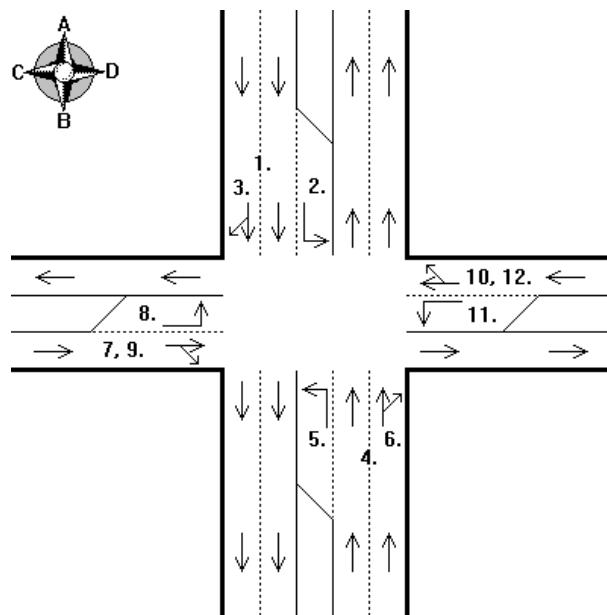
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	3270
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	3050
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	60
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	20
12	D-A Right Turn	20



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **79.11**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	35	<b>11.79</b>
<b>Leg B</b>	35	<b>11.79</b>
<b>Leg C</b>	30	<b>11.80</b>
<b>Leg D</b>	30	<b>11.80</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>25</b>
<b>Leg A Left Turn</b>	<b>25</b>
<b>Leg B Thru &amp; Rt</b>	<b>25</b>
<b>Leg B Left Turn</b>	<b>25</b>
<b>Leg C Thru &amp; Rt</b>	<b>95</b>
<b>Leg C Left Turn</b>	<b>95</b>
<b>Leg D Thru &amp; Rt</b>	<b>95</b>
<b>Leg D Left Turn</b>	<b>95</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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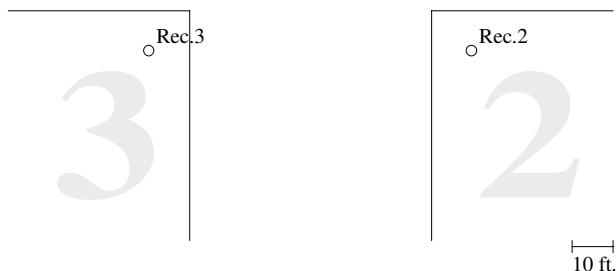
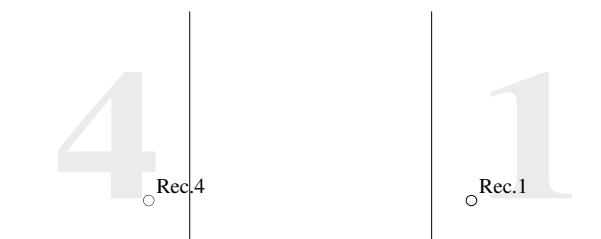
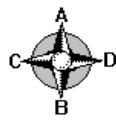
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:58 AM  
Westside SR 520



Description: **Montlake & Shelby B2040**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.0	2.8	Pass
2	2	10	10	3.7	2.6	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.1</u>	<u>2.9</u>	<u>Pass</u>
4	4	10	10	3.8	2.7	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

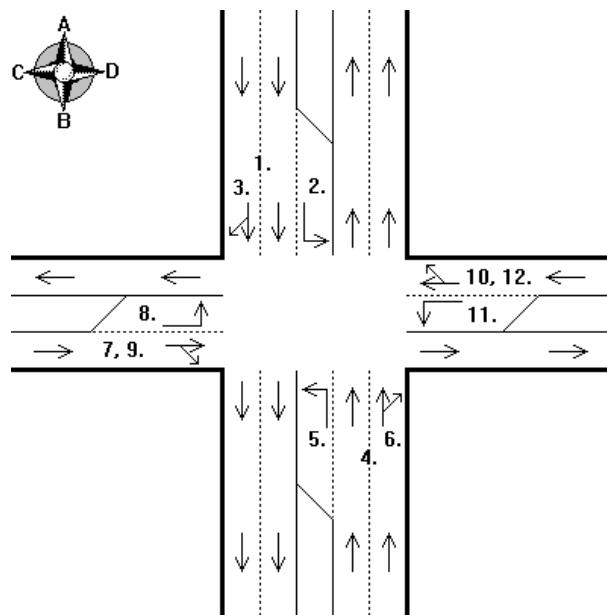
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	3404
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	3175
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	62
9	C-B Right Turn	62
10	D-C Thru	2
11	D-B Left Turn	21
12	D-A Right Turn	21



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.94**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	11.77
Leg B	35	11.77
Leg C	30	11.79
Leg D	30	11.79

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	25
Leg A Left Turn	25
Leg B Thru & Rt	25
Leg B Left Turn	25
Leg C Thru & Rt	95
Leg C Left Turn	95
Leg D Thru & Rt	95
Leg D Left Turn	95

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:18 AM  
Westside SR 520

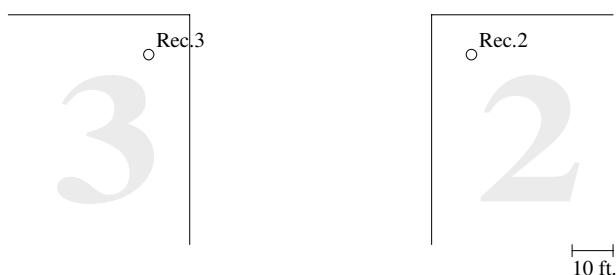
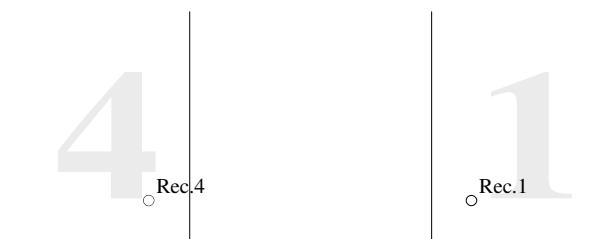
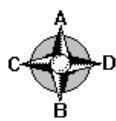


Description: **Montlake & Shelby EX2008**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	6.5	4.5	Pass
2	2	10	10	6.0	4.2	Pass
3	3	10	10	6.3	4.4	Pass
4	4	10	10	5.8	4.1	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

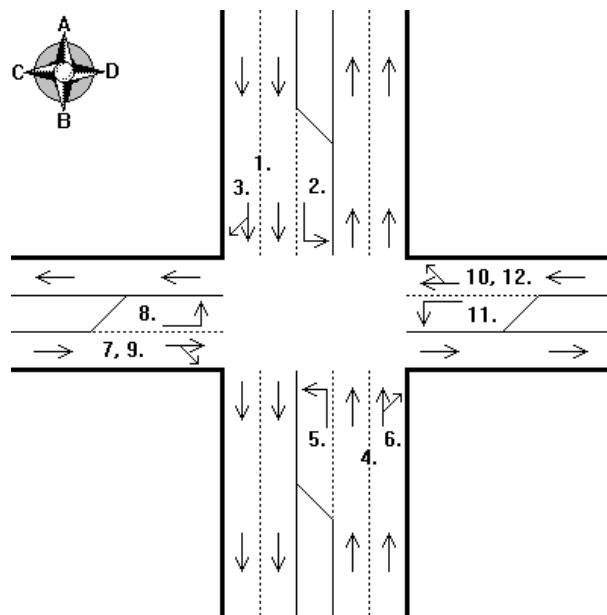
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2520
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	2480
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	50
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	20
12	D-A Right Turn	20



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2008**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **148.77**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	21.43
Leg B	35	21.43
Leg C	30	21.47
Leg D	30	21.47

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	26
Leg A Left Turn	26
Leg B Thru & Rt	46
Leg B Left Turn	46
Leg C Thru & Rt	94
Leg C Left Turn	94
Leg D Thru & Rt	94
Leg D Left Turn	94

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10  
01:35 PM  
Westside SR 520

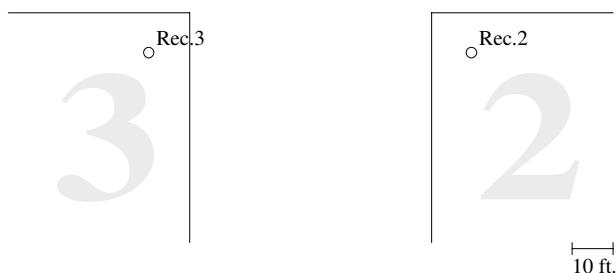
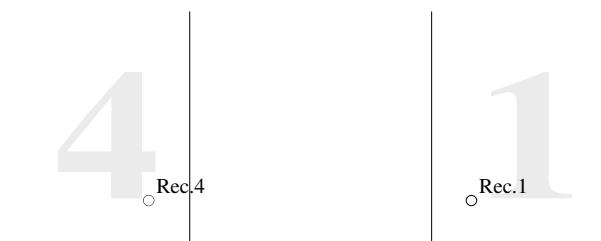
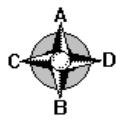


Description: **Montlake & Shelby NB2018**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.3	3.0	Pass
2	2	10	10	3.9	2.7	Pass
3	3	10	10	4.3	3.0	Pass
4	4	10	10	4.0	2.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

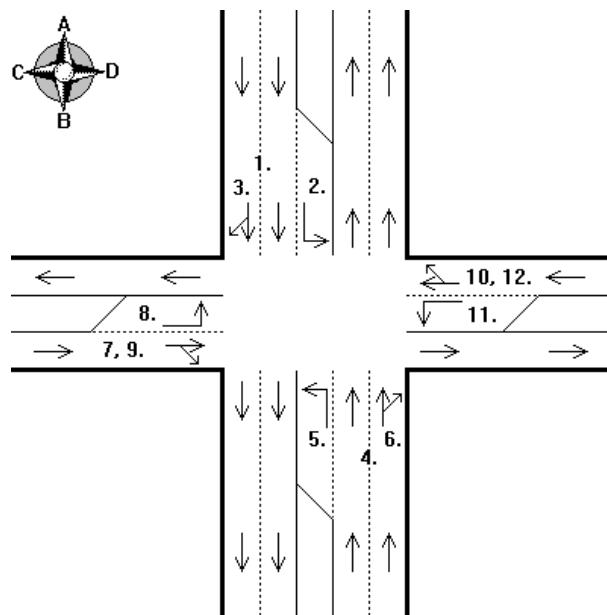
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	2780
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	2680
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	60
9	C-B Right Turn	50
10	D-C Thru	2
11	D-B Left Turn	20
12	D-A Right Turn	20



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **91.40**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	13.74
Leg B	35	13.74
Leg C	30	13.75
Leg D	30	13.75

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	25
Leg A Left Turn	25
Leg B Thru & Rt	38
Leg B Left Turn	38
Leg C Thru & Rt	95
Leg C Left Turn	95
Leg D Thru & Rt	95
Leg D Left Turn	95

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:48 AM  
Westside SR 520

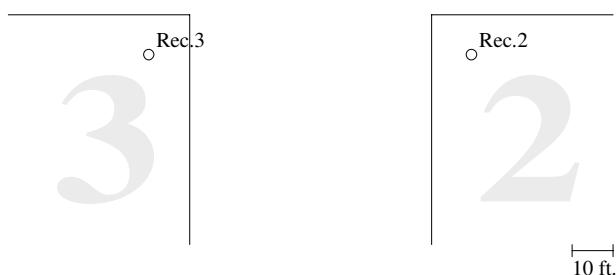
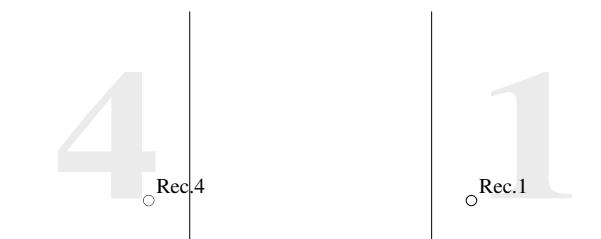
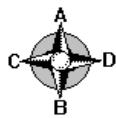


Description: **Montlake & Shelby NB2030**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.0	2.8	Pass
2	2	10	10	3.6	2.5	Pass
3	3	10	10	3.8	2.7	Pass
4	4	10	10	3.7	2.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

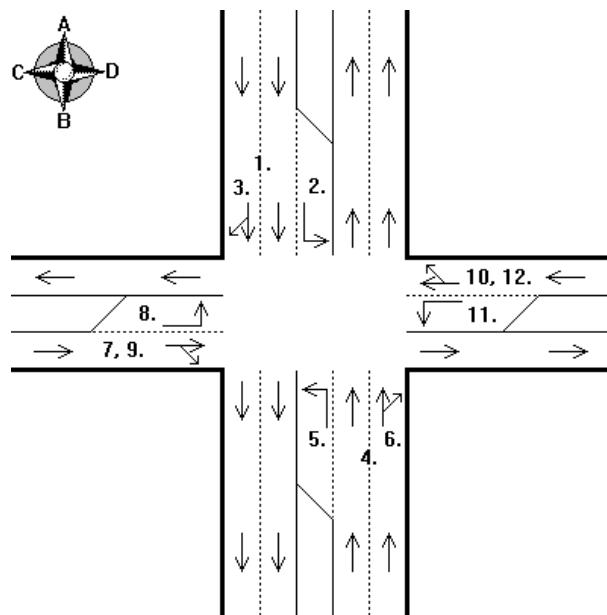
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	3030
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	3000
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	60
9	C-B Right Turn	60
10	D-C Thru	2
11	D-B Left Turn	20
12	D-A Right Turn	20



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **79.11**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	35	<b>11.79</b>
<b>Leg B</b>	35	<b>11.79</b>
<b>Leg C</b>	30	<b>11.80</b>
<b>Leg D</b>	30	<b>11.80</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>25</b>
<b>Leg A Left Turn</b>	<b>25</b>
<b>Leg B Thru &amp; Rt</b>	<b>38</b>
<b>Leg B Left Turn</b>	<b>38</b>
<b>Leg C Thru &amp; Rt</b>	<b>95</b>
<b>Leg C Left Turn</b>	<b>95</b>
<b>Leg D Thru &amp; Rt</b>	<b>95</b>
<b>Leg D Left Turn</b>	<b>95</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:10 AM  
Westside SR 520

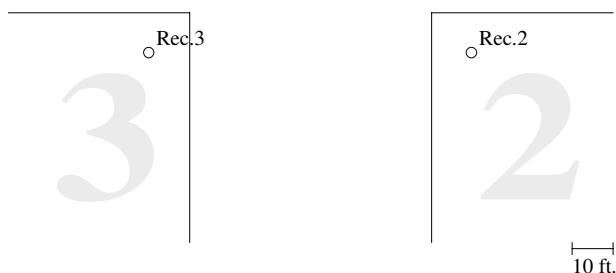
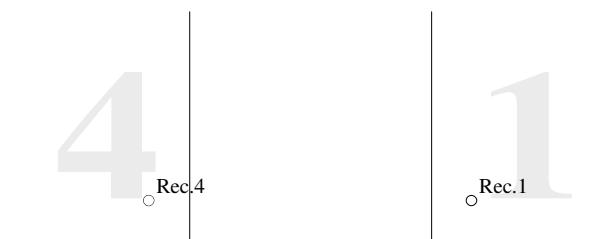
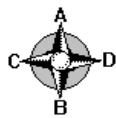


Description: **Montlake & Shelby NB2040**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Shelby St**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.2	2.9	Pass
2	2	10	10	3.7	2.6	Pass
3	3	10	10	4.0	2.8	Pass
4	4	10	10	3.7	2.6	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

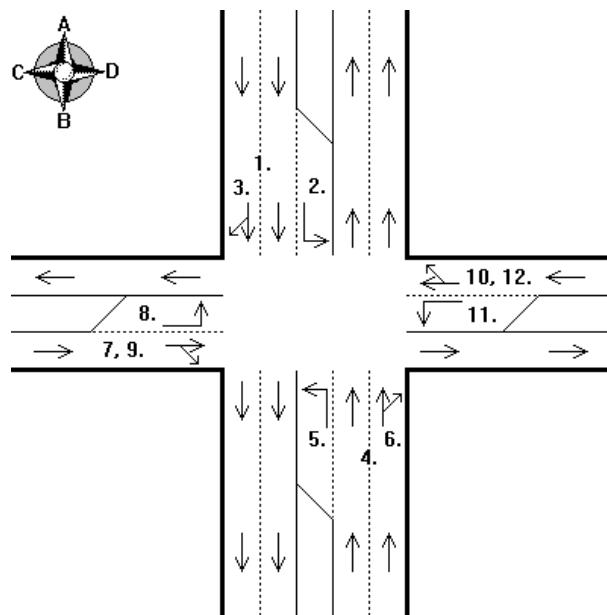
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	3154
2	A-D Left Turn	2
3	A-C Right Turn	2
4	B-A Thru	3123
5	B-C Left Turn	2
6	B-D Right Turn	2
7	C-D Thru	2
8	C-A Left Turn	62
9	C-B Right Turn	62
10	D-C Thru	2
11	D-B Left Turn	21
12	D-A Right Turn	21



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.94**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	11.77
Leg B	35	11.77
Leg C	30	11.79
Leg D	30	11.79

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	25
Leg A Left Turn	25
Leg B Thru & Rt	38
Leg B Left Turn	38
Leg C Thru & Rt	95
Leg C Left Turn	95
Leg D Thru & Rt	95
Leg D Left Turn	95

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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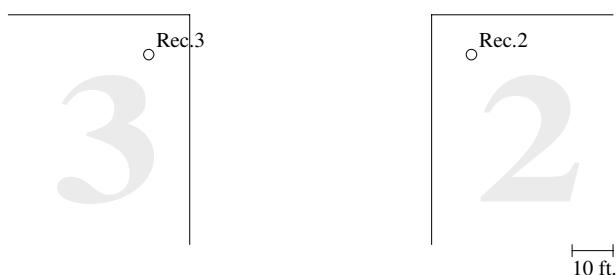
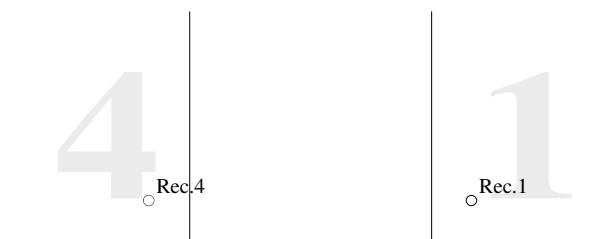
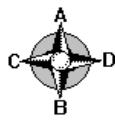
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# Washington State Intersection Screening Tool 1.0

12-01-10  
01:40 PM  
Westside SR 520



Description: **Montlake & Lake Washington - 2018B**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	4.0	2.8	Pass
2	2	10	10	4.1	2.9	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.8</u>	<u>3.4</u>	<u>Pass</u>
4	4	10	10	4.0	2.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

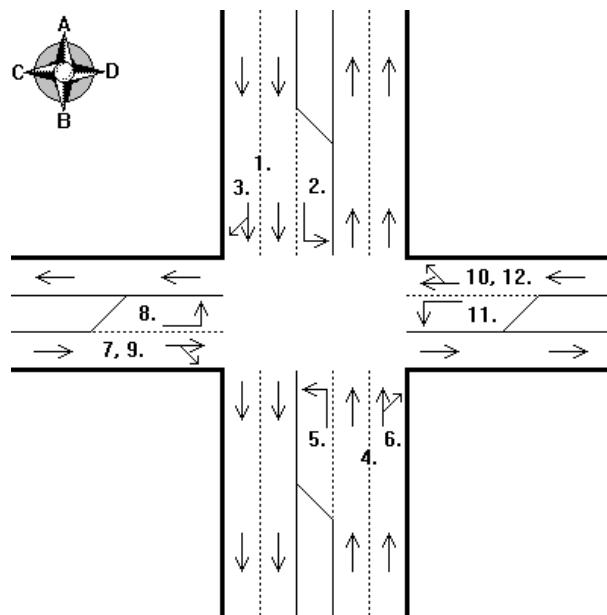
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1030
2	A-D Left Turn	240
3	A-C Right Turn	580
4	B-A Thru	1070
5	B-C Left Turn	250
6	B-D Right Turn	80
7	C-D Thru	140
8	C-A Left Turn	760
9	C-B Right Turn	210
10	D-C Thru	160
11	D-B Left Turn	240
12	D-A Right Turn	380



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **91.40**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	13.74
Leg B	35	13.74
Leg C	35	13.74
Leg D	35	13.74

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	70
Leg A Left Turn	98
Leg B Thru & Rt	72
Leg B Left Turn	100
Leg C Thru & Rt	90
Leg C Left Turn	90
Leg D Thru & Rt	101
Leg D Left Turn	101

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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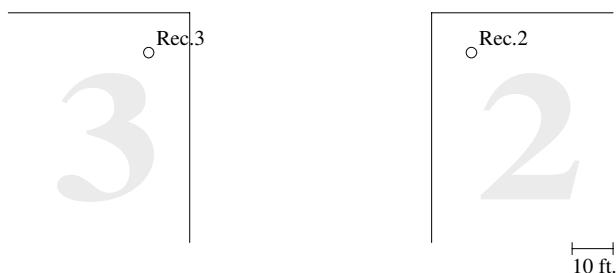
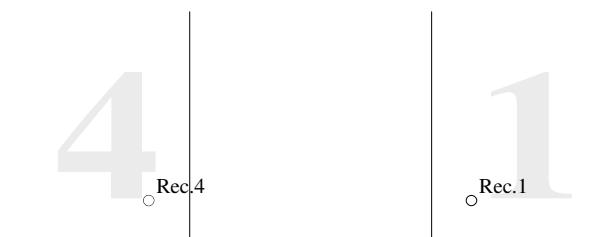
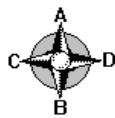
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:43 AM  
Westside SR 520



Description: **Montlake & Lake Washington - 2030B**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.8	2.7	Pass
2	2	10	10	3.9	2.7	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.6</u>	<u>3.2</u>	<u>Pass</u>
4	4	10	10	3.8	2.7	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

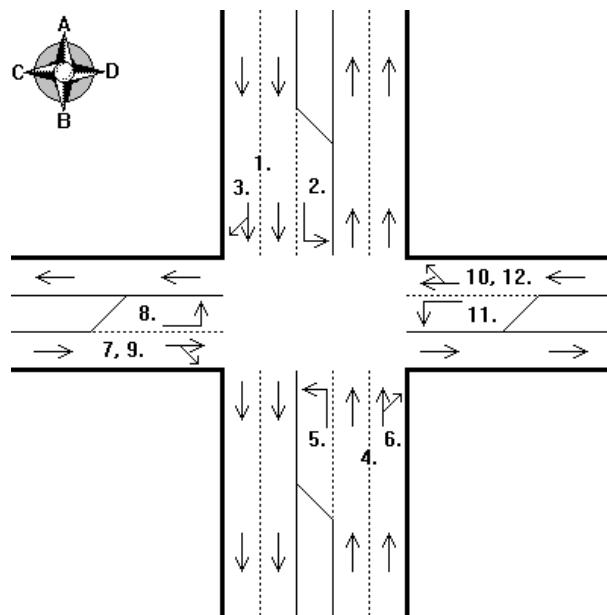
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1050
2	A-D Left Turn	270
3	A-C Right Turn	730
4	B-A Thru	1180
5	B-C Left Turn	310
6	B-D Right Turn	90
7	C-D Thru	160
8	C-A Left Turn	830
9	C-B Right Turn	230
10	D-C Thru	190
11	D-B Left Turn	300
12	D-A Right Turn	420



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **79.11**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>11.79</b>
<b>Leg B</b>	<b>35</b>	<b>11.79</b>
<b>Leg C</b>	<b>35</b>	<b>11.79</b>
<b>Leg D</b>	<b>35</b>	<b>11.79</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>72</b>
<b>Leg A Left Turn</b>	<b>99</b>
<b>Leg B Thru &amp; Rt</b>	<b>72</b>
<b>Leg B Left Turn</b>	<b>99</b>
<b>Leg C Thru &amp; Rt</b>	<b>89</b>
<b>Leg C Left Turn</b>	<b>89</b>
<b>Leg D Thru &amp; Rt</b>	<b>100</b>
<b>Leg D Left Turn</b>	<b>100</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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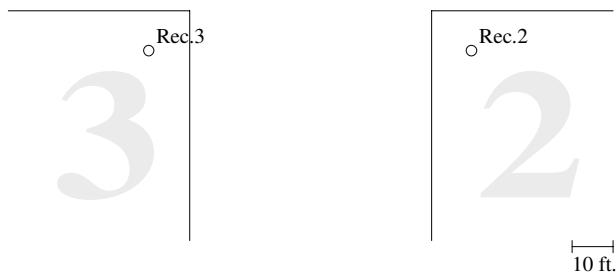
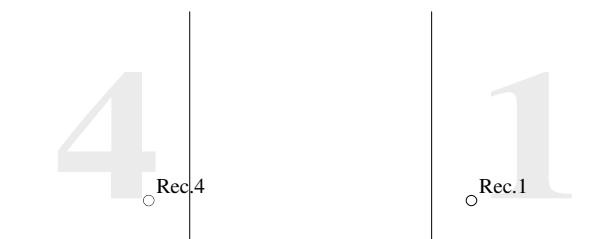
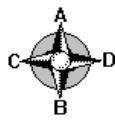
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:56 AM  
Westside SR 520



Description: **Montlake & Lake Washington - 2040B**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	5.2	3.6	Pass
2	2	10	10	4.5	3.1	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>5.3</u>	<u>3.7</u>	<u>Pass</u>
4	4	10	10	4.7	3.3	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

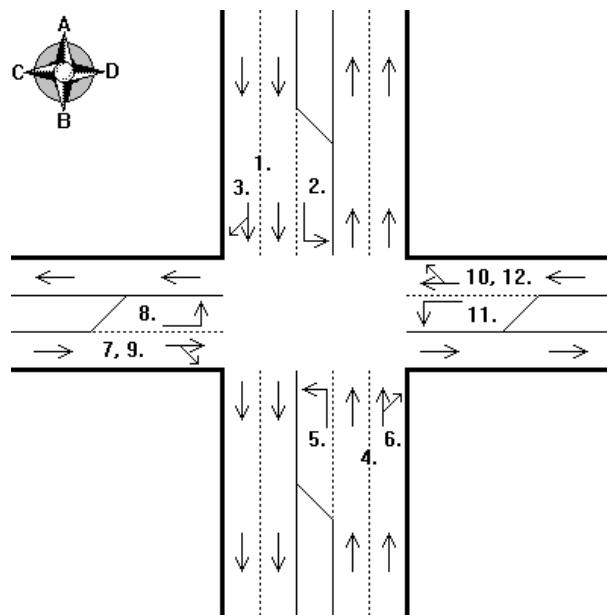
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1093
2	A-D Left Turn	281
3	A-C Right Turn	760
4	B-A Thru	1228
5	B-C Left Turn	323
6	B-D Right Turn	94
7	C-D Thru	167
8	C-A Left Turn	864
9	C-B Right Turn	239
10	D-C Thru	198
11	D-B Left Turn	312
12	D-A Right Turn	437



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.94**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>11.77</b>
<b>Leg B</b>	<b>35</b>	<b>11.77</b>
<b>Leg C</b>	<b>5</b>	<b>20.91</b>
<b>Leg D</b>	<b>5</b>	<b>20.91</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>72</b>
<b>Leg A Left Turn</b>	<b>99</b>
<b>Leg B Thru &amp; Rt</b>	<b>72</b>
<b>Leg B Left Turn</b>	<b>99</b>
<b>Leg C Thru &amp; Rt</b>	<b>89</b>
<b>Leg C Left Turn</b>	<b>89</b>
<b>Leg D Thru &amp; Rt</b>	<b>100</b>
<b>Leg D Left Turn</b>	<b>100</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:15 AM  
Westside SR 520

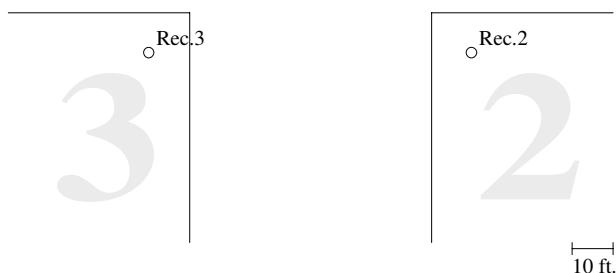
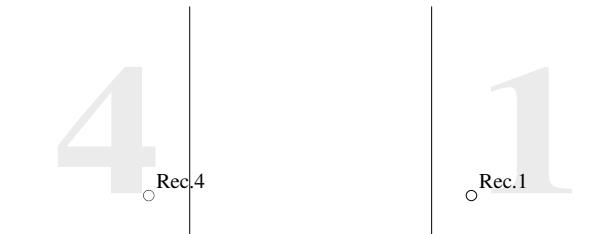
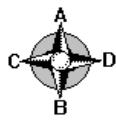


Description: **Montlake & Lake Washington - 2008 EX**

Performed by: **Ben Beattie - CH2M HILL**  
- benjamin.beattie@ch2m.com

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	5.7	4.0	Pass
2	2	10	10	6.0	4.2	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>6.9</u>	<u>4.8</u>	<u>Pass</u>
4	4	10	10	6.0	4.2	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

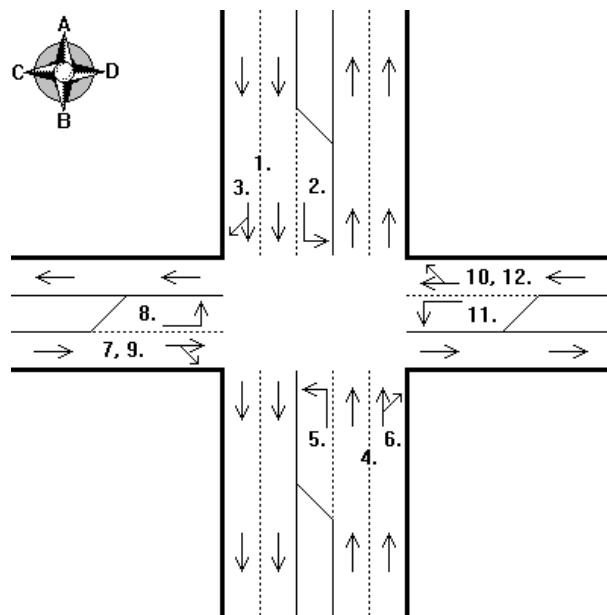
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	890
2	A-D Left Turn	220
3	A-C Right Turn	690
4	B-A Thru	1000
5	B-C Left Turn	190
6	B-D Right Turn	10
7	C-D Thru	130
8	C-A Left Turn	690
9	C-B Right Turn	210
10	D-C Thru	10
11	D-B Left Turn	120
12	D-A Right Turn	350



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2008**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **148.77**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	21.43
Leg B	35	21.43
Leg C	35	21.43
Leg D	35	21.43

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	77
Leg A Left Turn	95
Leg B Thru & Rt	75
Leg B Left Turn	93
Leg C Thru & Rt	82
Leg C Left Turn	82
Leg D Thru & Rt	108
Leg D Left Turn	108

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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# Washington State Intersection Screening Tool 1.0

12-01-10

01:42 PM

Westside SR 520



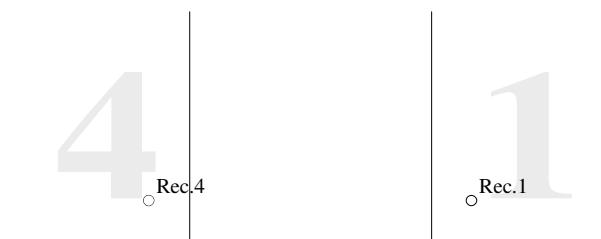
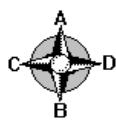
Description: **Montlake & Lake Washington - 2018NB**

Performed by: **Ben Beattie - CH2M HILL**

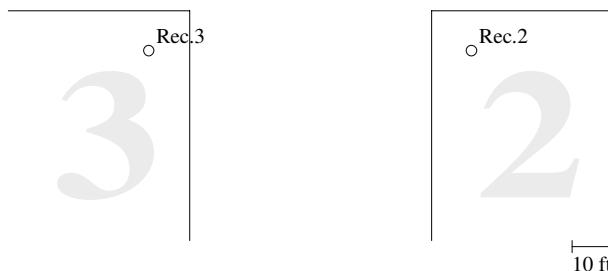
- [benjamin.beattie@ch2m.com](mailto:benjamin.beattie@ch2m.com)

Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**

Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



10 ft.



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.9	2.7	Pass
2	2	10	10	4.2	2.9	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>5.0</u>	<u>3.5</u>	<u>Pass</u>
4	4	10	10	4.2	2.9	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

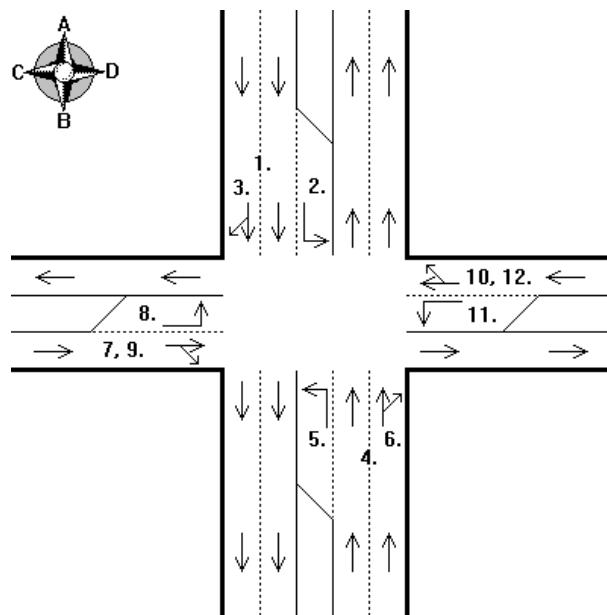
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	970
2	A-D Left Turn	240
3	A-C Right Turn	720
4	B-A Thru	1100
5	B-C Left Turn	190
6	B-D Right Turn	10
7	C-D Thru	140
8	C-A Left Turn	750
9	C-B Right Turn	220
10	D-C Thru	10
11	D-B Left Turn	120
12	D-A Right Turn	390



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2018**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **91.40**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	13.74
Leg B	35	13.74
Leg C	35	13.74
Leg D	35	13.74

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	77
Leg A Left Turn	100
Leg B Thru & Rt	78
Leg B Left Turn	101
Leg C Thru & Rt	75
Leg C Left Turn	75
Leg D Thru & Rt	107
Leg D Left Turn	107

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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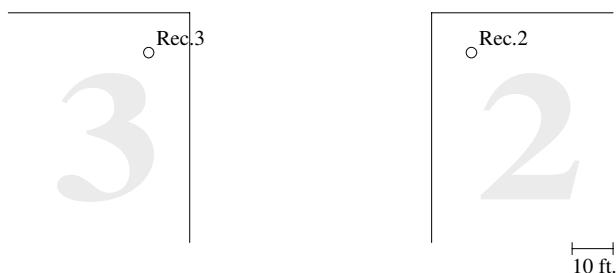
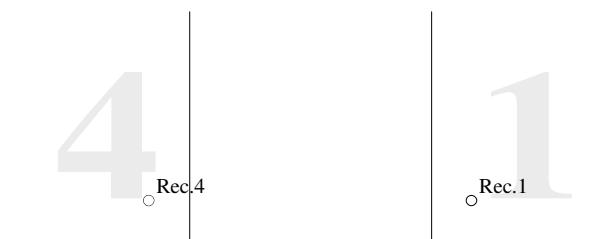
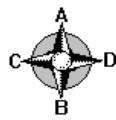
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# Washington State Intersection Screening Tool 1.0

11-01-10  
10:45 AM  
Westside SR 520



Description: **Montlake & Lake Washington - 2030NB**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.7	2.6	Pass
2	2	10	10	3.9	2.7	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.5</u>	<u>3.1</u>	<u>Pass</u>
4	4	10	10	4.0	2.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

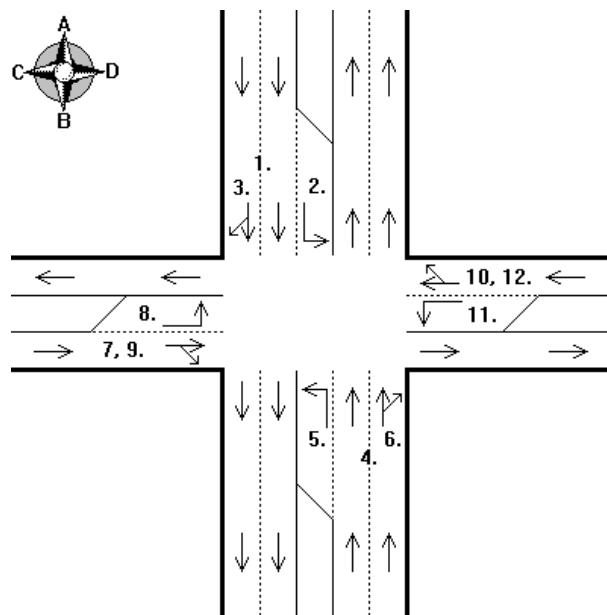
### Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1070
2	A-D Left Turn	270
3	A-C Right Turn	880
4	B-A Thru	1200
5	B-C Left Turn	240
6	B-D Right Turn	10
7	C-D Thru	150
8	C-A Left Turn	780
9	C-B Right Turn	230
10	D-C Thru	10
11	D-B Left Turn	150
12	D-A Right Turn	420



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2030**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **79.11**

Approach	Speed (mph)	EF (g/mile)
<b>Leg A</b>	<b>35</b>	<b>11.79</b>
<b>Leg B</b>	<b>35</b>	<b>11.79</b>
<b>Leg C</b>	<b>35</b>	<b>11.79</b>
<b>Leg D</b>	<b>35</b>	<b>11.79</b>

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
<b>Leg A Thru &amp; Rt</b>	<b>85</b>
<b>Leg A Left Turn</b>	<b>102</b>
<b>Leg B Thru &amp; Rt</b>	<b>84</b>
<b>Leg B Left Turn</b>	<b>101</b>
<b>Leg C Thru &amp; Rt</b>	<b>68</b>
<b>Leg C Left Turn</b>	<b>68</b>
<b>Leg D Thru &amp; Rt</b>	<b>106</b>
<b>Leg D Left Turn</b>	<b>106</b>

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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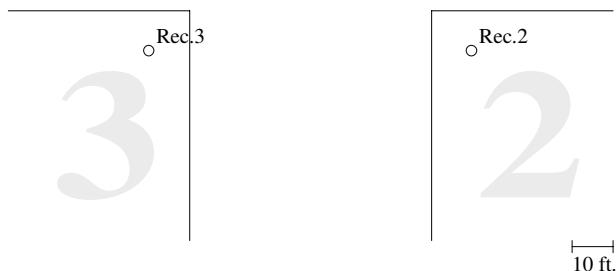
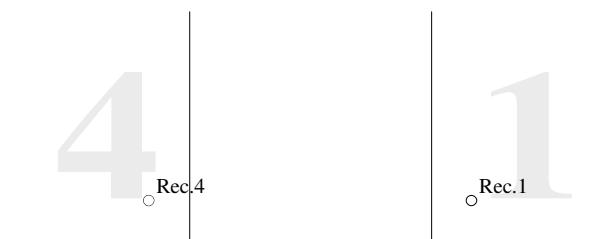
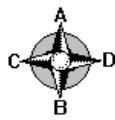
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# Washington State Intersection Screening Tool 1.0

11-01-10  
11:05 AM  
Westside SR 520



Description: **Montlake & Lake Washington - 2040NB**  
 Performed by: **Ben Beattie - CH2M HILL**  
                   - benjamin.beattie@ch2m.com  
 Intersection Type: **Four-Way Intersection, 4 x 2 w/4 Lt Turns**  
 Street Names: **A-B: Montlake Blvd C-D: Lake Wash/ SR520 EBOFF**



## RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	1	10	10	3.9	2.7	Pass
2	2	10	10	3.9	2.7	Pass
<u>3</u>	<u>3</u>	<u>10</u>	<u>10</u>	<u>4.8</u>	<u>3.4</u>	<u>Pass</u>
4	4	10	10	4.0	2.8	Pass

\*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **0.0** ppm.

- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

# Washington State Intersection Screening Tool 1.0



## USER INPUTS

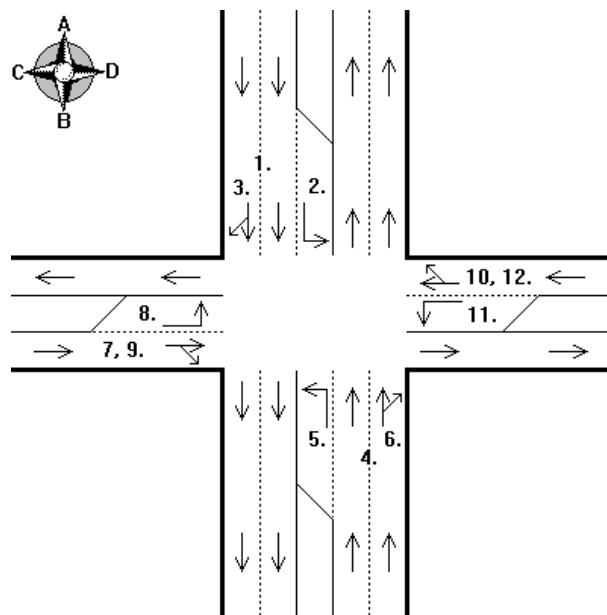
Westside SR 520

Intersection Data:

Predominant Surroundings: **Offices**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	A-B Thru	1114
2	A-D Left Turn	281
3	A-C Right Turn	916
4	B-A Thru	1249
5	B-C Left Turn	250
6	B-D Right Turn	10
7	C-D Thru	156
8	C-A Left Turn	812
9	C-B Right Turn	239
10	D-C Thru	10
11	D-B Left Turn	156
12	D-A Right Turn	437



# Washington State Intersection Screening Tool 1.0



## USER INPUTS continued...

### Westside SR 520

CO Emission Factors Based On:

Location: **Western Washington - KING County**

CO Maint. Area: **Puget Sound**

I/M Program: **No**

Model Year: **2040**

Gasoline sulfur content of 160 ppm for 2005-2006, 60 ppm for 2007, & 30 ppm for 2008-2050.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.94**

Approach	Speed (mph)	EF (g/mile)
Leg A	35	11.77
Leg B	35	11.77
Leg C	35	11.77
Leg D	35	11.77

**\*Note: Local roadways should be modeled using an approach speed of 15 mph or less.**

**Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **120**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	85
Leg A Left Turn	102
Leg B Thru & Rt	84
Leg B Left Turn	101
Leg C Thru & Rt	68
Leg C Left Turn	68
Leg D Thru & Rt	106
Leg D Left Turn	106

# Washington State Intersection Screening Tool 1.0



## USER COMMENTS

### Westside SR 520

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User Comments:

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## **Attachment 2D**

### **Detailed Data of Construction Air Quality Effects**



## I-5 Interchange Area

Equipment Type	Horsepower (hp)	Utilization Factor (%)	Load	# of Equipment	Mobilization		Reversible HOV Ramp		Westbound Mainline I-5 to PBB		Roanoke Lid		Eastbound Mainline and Ramps		10th Avenue/Delmar Lid		Demo Existing 10th/Delmar		Demo Existing Delmar Bridge		Delmar Lid		Demo Temp 10th Avenue Bridge	
					Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day	Working Days	Hours per Day
Backhoe	100	0.3	0.21	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Boom Truck	250	0.5	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Compactor *	200	0.2	0.43	1	21	20	126	20	126	20	0	0	126	20	95	20	0	20	0	20	95	20	63	20
Compressor	150	0.5	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Compressor	150	0.5	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Concrete pump	350	0.3	0.59	1	21	20	21	20	21	20	0	0	21	20	95	20	0	20	0	20	95	20	63	20
Concrete Saw	200	0.2	0.59	1	21	20	21	20	21	20	0	0	21	20	21	20	63	20	63	20	21	20	21	20
Cement Mixer	350	0.3	0.43	4	21	20	42	20	42	20	0	0	42	20	95	20	0	20	0	20	95	20	63	20
Crane	600	0.6	0.43	1	21	20	63	20	63	20	0	0	63	20	143	20	63	20	63	20	143	20	94	20
Dozer/CAT	150	0.1	0.59	1	21	20	63	20	63	20	0	0	63	20	95	20	30	20	30	20	95	20	63	20
Drill Rig	600	0.3	0.43	1	21	20	42	20	42	20	0	0	42	20	63	20	0	20	0	20	63	20	42	20
Dump Truck	350	0.3	0.59	5	21	20	126	20	126	20	0	0	126	20	95	20	63	20	63	20	95	20	94	20
Excavator	150	0.3	0.59	1	21	20	94	20	94	20	0	0	94	20	143	20	63	20	63	20	143	20	94	20
Fork Lift	200	0.5	0.59	2	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Generator Set Gas	60	0.7	1.00	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Generator Set Diesel	60	0.7	1.00	2	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
General Utility Truck	200	0.7	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Grader	150	0.2	0.59	1	21	20	94	20	94	20	0	0	94	20	21	20	0	20	0	20	21	20	21	20
Grinder	300	0.1	0.59	1	21	20	21	20	21	20	0	0	21	20	21	20	0	20	0	20	21	20	21	20
Light Plants	100	0.7	0.43	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Lift	100	0.8	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Loader	260	0.4	0.21	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	94	20
Paver	175	0.1	0.59	1	21	20	63	20	63	20	0	0	63	20	42	20	0	20	0	20	42	20	42	20
Paving Equipment	175	0.1	0.59	1	21	20	63	20	63	20	0	0	63	20	42	20	0	20	0	20	42	20	42	20
Pickup Truck	175	0.8	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Pile Driver	600	0.3	0.43	1	21	20	21	20	21	20	0	0	21	20	42	20	0	20	0	20	42	20	21	20
Pump	100	0.4	0.59	1	21	20	63	20	63	20	0	0	63	20	95	20	0	20	0	20	95	20	63	20
Roller	140	0.2	0.59	1	21	20	94	20	94	20	0	0	94	20	42	20	0	20	0	20	42	20	63	20
Scraper	350	0.1	0.59	1	21	20	0	20	0	20	0	0	0	20	0	20	0	20	0	20	0	20	0	20
Signal Board	100	0.7	0.43	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Street Sweepers	250	0.5	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Trencher	150	0.3	0.59	1	21	20	42	20	42	20	0	0	42	20	42	20	0	20	0	20	42	20	42	20
Vibratory Hammer	450	0.3	0.59	1	21	20	21	20	21	20	0	0	21	20	63	20	0	20	0	20	63	20	42	20
Water Truck	350	0.4	0.59	1	21	20	126	20	126	20	0	0	126	20	190	20	63	20	63	20	190	20	126	20
Welders	60	0.3	0.59	1	21	20	21	20	21	20	0	0	21	20	190	20	0	20	0	20	190	20	42	20
Tug Boat	2000	0.5	0.59	1	0	20	0	20	0	20	0	0	20	0	20	0	0	20	0	20	0	0	20	
Floating Derrick Crane	600	0.6	0.59	1	0	20	0	20	0	20	0	0	20	0	20	0	0	20	0	20	0	0	20	

Emission factors from NONROAD2008 Model

### **Tug Boat emission factors from**

### **Load factors from**

I-5 Interchange Area Emissions (tpy)						
Calendar Year	NOx	CO	Sox	VOC	PM10	PM2.5
2016 Emissions	14.89	6.45	0.03	1.45	1.01	0.98
2017 Emissions	26.31	11.37	0.05	2.73	1.74	1.68
2018 Emissions	23.24	10.02	0.05	2.58	1.50	1.46

## I-5 Interchange Area

Equipment Type	Segment Total		2016												2017							
	Total Working Days	Hours per Day	Working Days in 2016	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2017	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	
Backhoe	1031	20	206	5.288	0.15	4.285	0.12	0.006	0.00	0.741	0.02	0.764	0.02	0.883	0.03	412	4.895	0.28	3.940	0.23	0.006	
Boom Truck	1031	20	206	0.203	0.07	0.859	0.29	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.05	412	0.163	0.11	0.633	0.42	0.004	
Compactor *	652	20	130	0.769	0.04	2.307	0.11	0.004	0.00	0.141	0.01	0.145	0.01	0.214	0.01	261	0.682	0.07	2.026	0.20	0.004	
Compressor	1031	20	206	0.994	0.20	2.493	0.50	0.004	0.00	0.210	0.04	0.216	0.04	0.236	0.05	412	0.890	0.36	2.197	0.88	0.004	
Compressor	1031	20	206	0.994	0.20	2.493	0.50	0.004	0.00	0.210	0.04	0.216	0.04	0.236	0.05	412	0.890	0.36	2.197	0.88	0.004	
Concrete pump	337	20	67	1.419	0.13	3.284	0.30	0.004	0.00	0.186	0.02	0.192	0.02	0.227	0.02	135	1.290	0.24	3.003	0.55	0.004	
Concrete Saw	273	20	55	0.769	0.02	2.307	0.07	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.01	109	0.682	0.04	2.026	0.12	0.004	
Cement Mixer	400	20	80	1.209	0.39	4.171	1.33	0.004	0.00	0.164	0.05	0.169	0.05	0.292	0.09	160	1.112	0.71	3.877	2.47	0.004	
Crane	716	20	143	0.743	0.36	2.888	1.41	0.004	0.00	0.109	0.05	0.112	0.05	0.194	0.09	286	0.668	0.65	2.583	2.52	0.004	
Dozer/CAT	523	20	105	0.738	0.02	1.703	0.03	0.004	0.00	0.171	0.00	0.176	0.00	0.182	0.00	209	0.612	0.02	1.411	0.06	0.004	
Drill Rig	315	20	63	1.253	0.13	4.190	0.45	0.004	0.00	0.185	0.02	0.190	0.02	0.295	0.03	126	1.152	0.25	3.895	0.84	0.004	
Dump Truck	809	20	162	0.499	0.55	1.330	1.47	0.004	0.00	0.076	0.08	0.079	0.09	0.151	0.17	324	0.372	0.82	1.060	2.34	0.004	
Excavator	809	20	162	0.650	0.06	1.492	0.14	0.004	0.00	0.150	0.01	0.155	0.01	0.171	0.02	324	0.510	0.10	1.201	0.23	0.004	
Fork Lift	1031	20	206	0.705	0.38	2.111	1.13	0.004	0.00	0.131	0.07	0.135	0.07	0.200	0.11	412	0.617	0.66	1.826	1.96	0.004	
Generator Set Gas	1031	20	206	2.408	0.46	3.719	0.71	0.005	0.00	0.278	0.05	0.286	0.05	0.295	0.06	412	2.163	0.83	3.585	1.37	0.005	
Generator Set Diesel	1031	20	206	2.408	0.92	3.719	1.42	0.005	0.00	0.278	0.11	0.286	0.11	0.295	0.11	412	2.163	1.65	3.585	2.74	0.005	
General Utility Truck	1031	20	206	0.203	0.08	0.859	0.32	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.05	412	0.163	0.12	0.633	0.48	0.004	
Grader	366	20	73	0.726	0.02	1.669	0.05	0.004	0.00	0.168	0.00	0.174	0.00	0.180	0.01	146	0.598	0.03	1.378	0.08	0.004	
Grinder	147	20	29	0.769	0.01	2.307	0.03	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00	59	0.682	0.02	2.026	0.05	0.004	
Light Plants	1031	20	206	2.148	0.29	3.899	0.53	0.005	0.00	0.368	0.05	0.379	0.05	0.428	0.06	412	1.990	0.54	3.602	0.99	0.005	
Lift	1031	20	206	2.596	0.56	2.885	0.62	0.005	0.00	0.334	0.07	0.344	0.07	0.294	0.06	412	2.344	1.01	2.551	1.09	0.005	
Loader	999	20	200	1.930	0.19	3.763	0.36	0.005	0.00	0.352	0.03	0.362	0.03	0.567	0.05	400	1.765	0.34	3.447	0.66	0.005	
Paver	336	20	67	0.803	0.01	1.892	0.03	0.004	0.00	0.185	0.00	0.191	0.00	0.192	0.00	134	0.690	0.02	1.607	0.05	0.004	
Paving Equipment	336	20	67	0.971	0.01	2.426	0.04	0.004	0.00	0.207	0.00	0.213	0.00	0.231	0.00	134	0.866	0.03	2.127	0.07	0.004	
Pickup Truck	1031	20	206	0.322	0.12	0.933	0.35	0.004	0.00	0.063	0.02	0.065	0.02	0.148	0.06	412	0.239	0.18	0.675	0.51	0.004	
Pile Driver	189	20	38	1.253	0.08	4.190	0.27	0.004	0.00	0.185	0.01	0.190	0.01	0.295	0.02	76	1.152	0.15	3.895	0.50	0.004	
Pump	463	20	93	2.596	0.13	2.885	0.14	0.005	0.00	0.334	0.02	0.344	0.02	0.294	0.01	185	2.344	0.23	2.551	0.25	0.005	
Roller	450	20	90	0.845	0.03	2.041	0.07	0.004	0.00	0.191	0.01	0.197	0.01	0.203	0.01	180	0.738	0.05	1.735	0.11	0.004	
Scraper	21	20	4	0.911	0.00	2.271	0.00	0.004	0.00	0.127	0.00	0.131	0.00	0.172	0.00	8	0.805	0.00	1.986	0.01	0.004	
Signal Board	1031	20	206	2.148	0.29	3.899	0.53	0.005	0.00	0.368	0.05	0.379	0.05	0.428	0.06	412	1.990	0.54	3.602	0.99	0.005	
Street Sweepers	1031	20	206	0.769	0.26	2.307	0.77	0.004	0.00	0.141	0.05	0.145	0.05	0.214	0.07	412	0.682	0.46	2.026	1.36	0.004	
Trencher	273	20	55	1.011	0.03	2.537	0.08	0.004	0.00	0.212	0.01	0.218	0.01	0.240	0.01	109	0.907	0.06	2.242	0.14	0.004	
Vibratory Hammer	252	20	50	1.419	0.13	3.284	0.29	0.004	0.00</													

## I-5 Interchange Area

Equipment Type	2017 (cont.)							2018												
	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2018	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.00	0.678	0.04	0.699	0.04	0.799	0.05	412	4.557	0.26	3.625	0.21	0.006	0.00	0.623	0.04	0.642	0.04	0.731	0.04
Boom Truck	0.00	0.021	0.01	0.021	0.01	0.142	0.09	412	0.139	0.09	0.446	0.30	0.004	0.00	0.015	0.01	0.016	0.01	0.140	0.09
Compactor *	0.00	0.126	0.01	0.129	0.01	0.200	0.02	261	0.600	0.06	1.767	0.17	0.004	0.00	0.111	0.01	0.115	0.01	0.187	0.02
Compressor	0.00	0.190	0.08	0.196	0.08	0.220	0.09	412	0.791	0.32	1.922	0.77	0.004	0.00	0.172	0.07	0.177	0.07	0.205	0.08
Compressor	0.00	0.190	0.08	0.196	0.08	0.220	0.09	412	0.791	0.32	1.922	0.77	0.004	0.00	0.172	0.07	0.177	0.07	0.205	0.08
Concrete pump	0.00	0.170	0.03	0.176	0.03	0.215	0.04	135	1.171	0.22	2.737	0.50	0.004	0.00	0.155	0.03	0.160	0.03	0.206	0.04
Concrete Saw	0.00	0.126	0.01	0.129	0.01	0.200	0.01	109	0.600	0.03	1.767	0.10	0.004	0.00	0.111	0.01	0.115	0.01	0.187	0.01
Cement Mixer	0.00	0.150	0.10	0.155	0.10	0.275	0.18	160	1.019	0.65	3.594	2.29	0.004	0.00	0.137	0.09	0.141	0.09	0.258	0.16
Crane	0.00	0.098	0.10	0.101	0.10	0.186	0.18	286	0.602	0.59	2.313	2.26	0.004	0.00	0.089	0.09	0.091	0.09	0.179	0.17
Dozer/CAT	0.00	0.139	0.01	0.143	0.01	0.171	0.01	209	0.492	0.02	1.155	0.05	0.004	0.00	0.108	0.00	0.111	0.00	0.162	0.01
Drill Rig	0.00	0.170	0.04	0.175	0.04	0.277	0.06	126	1.056	0.23	3.611	0.78	0.004	0.00	0.155	0.03	0.160	0.03	0.260	0.06
Dump Truck	0.01	0.054	0.12	0.055	0.12	0.147	0.32	324	0.266	0.59	0.825	1.82	0.004	0.01	0.034	0.08	0.035	0.08	0.143	0.32
Excavator	0.00	0.113	0.02	0.117	0.02	0.161	0.03	324	0.380	0.07	0.940	0.18	0.004	0.00	0.078	0.01	0.080	0.02	0.153	0.03
Fork Lift	0.00	0.116	0.12	0.120	0.13	0.187	0.20	412	0.535	0.57	1.582	1.70	0.004	0.00	0.100	0.11	0.103	0.11	0.177	0.19
Generator Set Gas	0.00	0.241	0.09	0.248	0.09	0.268	0.10	412	1.930	0.74	3.473	1.33	0.005	0.00	0.211	0.08	0.217	0.08	0.244	0.09
Generator Set Diesel	0.00	0.241	0.18	0.248	0.19	0.268	0.20	412	1.930	1.47	3.473	2.65	0.005	0.00	0.211	0.16	0.217	0.17	0.244	0.19
General Utility Truck	0.00	0.021	0.02	0.021	0.02	0.142	0.11	412	0.139	0.10	0.446	0.33	0.004	0.00	0.015	0.01	0.016	0.01	0.140	0.11
Grader	0.00	0.136	0.01	0.140	0.01	0.169	0.01	146	0.477	0.03	1.122	0.06	0.004	0.00	0.104	0.01	0.107	0.01	0.161	0.01
Grinder	0.00	0.126	0.00	0.129	0.00	0.200	0.00	59	0.600	0.01	1.767	0.04	0.004	0.00	0.111	0.00	0.115	0.00	0.187	0.00
Light Plants	0.00	0.336	0.09	0.346	0.09	0.394	0.11	412	1.841	0.50	3.319	0.91	0.005	0.00	0.306	0.08	0.315	0.09	0.363	0.10
Lift	0.00	0.295	0.13	0.304	0.13	0.267	0.11	412	2.103	0.90	2.246	0.96	0.005	0.00	0.263	0.11	0.271	0.12	0.243	0.10
Loader	0.00	0.322	0.06	0.332	0.06	0.524	0.10	400	1.615	0.31	3.146	0.61	0.005	0.00	0.294	0.06	0.303	0.06	0.485	0.09
Paver	0.00	0.158	0.00	0.163	0.00	0.181	0.01	134	0.581	0.02	1.349	0.04	0.004	0.00	0.130	0.00	0.134	0.00	0.171	0.01
Paving Equipment	0.00	0.187	0.01	0.193	0.01	0.215	0.01	134	0.767	0.02	1.851	0.06	0.004	0.00	0.169	0.01	0.174	0.01	0.200	0.01
Pickup Truck	0.00	0.039	0.03	0.040	0.03	0.144	0.11	412	0.192	0.14	0.472	0.35	0.004	0.00	0.026	0.02	0.027	0.02	0.142	0.11
Pile Driver	0.00	0.170	0.02	0.175	0.02	0.277	0.04	76	1.056	0.14	3.611	0.47	0.004	0.00	0.155	0.02	0.160	0.02	0.260	0.03
Pump	0.00	0.295	0.03	0.304	0.03	0.267	0.03	185	2.103	0.20	2.246	0.22	0.005	0.00	0.263	0.03	0.271	0.03	0.243	0.02
Roller	0.00	0.169	0.01	0.174	0.01	0.187	0.01	180	0.635	0.04	1.481	0.10	0.004	0.00	0.144	0.01	0.148	0.01	0.177	0.01
Scraper	0.00	0.114	0.00	0.118	0.00	0.166	0.00	8	0.705	0.00	1.720	0.01	0.004	0.00	0.102	0.00	0.105	0.00	0.161	0.00
Signal Board	0.00	0.336	0.09	0.346	0.09	0.394	0.11	412	1.841	0.50	3.319	0.91	0.005	0.00	0.306	0.08	0.315	0.09	0.363	0.10
Street Sweepers	0.00	0.126	0.08	0.129	0.09	0.200	0.13	412	0.600	0.40	1.767	1.18	0.004	0.00	0.111	0.07	0.115	0.08	0.187	0.13
Trencher	0.00	0.193	0.01	0.199	0.01	0.223	0.01	109	0.809	0.05	1.968	0.13	0.004	0.00	0.174	0.01	0.180	0.01	0.208	0.01
Vibratory Hammer	0.00	0.170	0.03	0.176	0.03	0.215	0.04	101	1.171	0.21	2.737	0.48	0.004	0.00	0.155	0.03	0.160	0.03	0.206	0.04
Water Truck	0.00	0.021	0.02	0.021	0.02	0.142	0.11</td													



Portage Bay Area

Equipment Type	Horsepower (hp)	Utilization Factor (%)	Load	# of Equipment	Portage Bay		2013												
					Total Working Days	Hours per Day	Working Days in 2013	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	100	0.3	0.21	1	300	20	27	6.569	0.02	5.413	0.02	0.006	0.00	0.945	0.00	0.974	0.00	1.165	0.00
Boom Truck	250	0.5	0.59	1	800	20	73	0.631	0.07	1.984	0.23	0.004	0.00	0.118	0.01	0.122	0.01	0.171	0.02
Compactor *	200	0.2	0.43	1	0	20	0	1.071	0.00	3.339	0.00	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Compressor	150	0.5	0.59	1	1600	20	145	1.353	0.19	3.569	0.51	0.005	0.00	0.277	0.04	0.285	0.04	0.293	0.04
Compressor	150	0.5	0.59	1	1600	20	145	1.353	0.19	3.569	0.51	0.005	0.00	0.277	0.04	0.285	0.04	0.293	0.04
Concrete pump	350	0.3	0.59	1	800	20	73	1.931	0.19	4.272	0.42	0.005	0.00	0.250	0.02	0.258	0.03	0.282	0.03
Concrete Saw	200	0.2	0.59	1	200	20	18	1.353	0.01	3.569	0.03	0.005	0.00	0.277	0.00	0.285	0.00	0.293	0.00
Cement Mixer	350	0.3	0.43	4	800	20	73	1.530	0.44	5.124	1.48	0.005	0.00	0.210	0.06	0.216	0.06	0.351	0.10
Crane	600	0.6	0.43	3	1600	20	145	0.999	1.49	3.917	5.83	0.005	0.01	0.147	0.22	0.151	0.23	0.225	0.33
Dozer/CAT	150	0.1	0.59	1	100	20	9	1.136	0.00	2.826	0.01	0.005	0.00	0.254	0.00	0.261	0.00	0.236	0.00
Drill Rig	600	0.3	0.43	1	300	20	27	1.585	0.07	5.147	0.24	0.005	0.00	0.234	0.01	0.242	0.01	0.355	0.02
Dump Truck	350	0.3	0.59	1	300	20	27	0.940	0.04	2.328	0.09	0.004	0.00	0.146	0.01	0.150	0.01	0.166	0.01
Excavator	150	0.3	0.59	1	300	20	27	1.103	0.02	2.636	0.04	0.005	0.00	0.253	0.00	0.261	0.00	0.220	0.00
Fork Lift	200	0.5	0.59	2	1600	20	145	1.009	0.38	3.145	1.19	0.005	0.00	0.186	0.07	0.192	0.07	0.248	0.09
Generator Set Gas	60	0.7	1.00	1	1600	20	145	3.210	0.43	4.191	0.56	0.005	0.00	0.404	0.05	0.416	0.06	0.394	0.05
Generator Set Diesel	60	0.7	1.00	2	1600	20	145	3.210	0.86	4.191	1.13	0.005	0.00	0.404	0.11	0.416	0.11	0.394	0.11
General Utility Truck	200	0.7	0.59	1	1600	20	145	0.631	0.17	1.984	0.53	0.004	0.00	0.118	0.03	0.122	0.03	0.171	0.05
Grader	150	0.2	0.59	1	0	20	0	1.132	0.00	2.797	0.00	0.005	0.00	0.254	0.00	0.261	0.00	0.234	0.00
Grinder	300	0.1	0.59	1	0	20	0	1.071	0.00	3.339	0.00	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Light Plants	100	0.7	0.43	1	1600	20	145	2.661	0.26	4.861	0.47	0.005	0.00	0.468	0.05	0.483	0.05	0.539	0.05
Lift	100	0.8	0.59	1	1600	20	145	3.417	0.52	4.002	0.61	0.005	0.00	0.465	0.07	0.479	0.07	0.393	0.06
Loader	260	0.4	0.21	1	1200	20	109	2.669	0.14	4.892	0.26	0.005	0.00	0.458	0.02	0.472	0.02	0.736	0.04
Paver	175	0.1	0.59	1	300	20	27	1.179	0.01	3.008	0.02	0.005	0.00	0.256	0.00	0.264	0.00	0.251	0.00
Paving Equipment	175	0.1	0.59	1	300	20	27	1.333	0.01	3.505	0.02	0.005	0.00	0.274	0.00	0.282	0.00	0.288	0.00
Pickup Truck	175	0.8	0.59	1	1600	20	145	0.967	0.26	2.227	0.59	0.004	0.00	0.234	0.06	0.241	0.06	0.187	0.05
Pile Driver	600	0.3	0.43	1	600	20	55	1.585	0.15	5.147	0.48	0.005	0.00	0.234	0.02	0.242	0.02	0.355	0.03
Pump	100	0.4	0.59	1	1600	20	145	3.417	0.26	4.002	0.30	0.005	0.00	0.465	0.04	0.479	0.04	0.393	0.03
Roller	140	0.2	0.59	1	0	20	0	1.216	0.00	3.132	0.00	0.005	0.00	0.259	0.00	0.267	0.00	0.262	0.00
Scraper	350	0.1	0.59	1	0	20	0	1.287	0.00	3.264	0.00	0.005	0.00	0.169	0.00	0.174	0.00	0.196	0.00
Signal Board	100	0.7	0.43	1	1600	20	145	2.661	0.26	4.861	0.47	0.005	0.00	0.468	0.05	0.483	0.05	0.539	0.05
Street Sweepers	250	0.5	0.59	1	1600	20	145	1.071	0.25	3.339	0.79	0.005	0.00	0.199	0.05	0.205	0.05	0.261	0.06
Trencher	150	0.3	0.59	1	0	20	0	1.370	0.00	3.609	0.00	0.005	0.00	0.279	0.00	0.287	0.00	0.296	0.00
Vibratory Hammer	450	0.3	0.59	1	600	20	55	1.931	0.18	4.272	0.41	0.005	0.00	0.250	0.02	0.258	0.02	0.282	0.03
Water Truck	350	0.4	0.59	1	1600	20	145	0.631	0.17	1.984	0.53	0.004	0.00	0.118	0.03	0.122	0.03	0.171	0.05
Welders	60	0.3	0.59	1	1600	20	145	3.210	0.11	4.191	0.14	0.005	0.00	0.404	0.01	0.416	0.01	0.394	0.01
Tug Boat	2000	0.5	0.59	1	0	20	0	1.520	0.00	4.510	0.00	0.005	0.00	0.200	0.00	0.210	0.00	0.250	0.00
Floating Derrick Crane	600	0.6	0.59	1	300	20	27	1.931	0.25	4.272	0.55	0.005	0.00	0.250	0.03	0.258	0.03	0.282	0.04
<b>Total Emissions by Year</b>								7.40		18.45		0.02		1.14</					

Portage Bay Area

Equipment Type	2014												2015							
	Working Days in 2014	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2015	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)
Backhoe	55	6.128	0.05	5.021	0.04	0.006	0.00	0.876	0.01	0.903	0.01	1.067	0.01	55	5.700	0.04	4.645	0.04	0.006	0.00
Boom Truck	145	0.444	0.10	1.535	0.36	0.004	0.00	0.080	0.02	0.083	0.02	0.158	0.04	145	0.274	0.06	1.135	0.27	0.004	0.00
Compactor *	0	0.963	0.00	2.973	0.00	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	0	0.862	0.00	2.626	0.00	0.004	0.00
Compressor	291	1.225	0.35	3.188	0.90	0.005	0.00	0.254	0.07	0.261	0.07	0.273	0.08	291	1.106	0.31	2.827	0.80	0.004	0.00
Compressor	291	1.225	0.35	3.188	0.90	0.005	0.00	0.254	0.07	0.261	0.07	0.273	0.08	291	1.106	0.31	2.827	0.80	0.004	0.00
Concrete pump	145	1.739	0.35	3.917	0.78	0.005	0.00	0.226	0.04	0.233	0.05	0.260	0.05	145	1.560	0.31	3.581	0.71	0.005	0.00
Concrete Saw	36	0.963	0.02	2.973	0.06	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	36	0.862	0.02	2.626	0.05	0.004	0.00
Cement Mixer	145	1.418	0.82	4.793	2.78	0.005	0.00	0.193	0.11	0.199	0.12	0.331	0.19	145	1.311	0.76	4.475	2.59	0.005	0.00
Crane	291	0.908	2.70	3.555	10.59	0.005	0.01	0.133	0.40	0.137	0.41	0.213	0.63	291	0.823	2.45	3.213	9.57	0.004	0.01
Dozer/CAT	18	1.000	0.00	2.408	0.01	0.004	0.00	0.228	0.00	0.235	0.00	0.214	0.00	18	0.867	0.00	2.022	0.01	0.004	0.00
Drill Rig	55	1.469	0.14	4.815	0.45	0.005	0.00	0.217	0.02	0.224	0.02	0.334	0.03	55	1.358	0.13	4.496	0.42	0.005	0.00
Dump Truck	55	0.783	0.06	1.955	0.15	0.004	0.00	0.123	0.01	0.127	0.01	0.161	0.01	55	0.637	0.05	1.627	0.12	0.004	0.00
Excavator	55	0.949	0.03	2.191	0.07	0.004	0.00	0.223	0.01	0.230	0.01	0.197	0.01	55	0.797	0.03	1.824	0.06	0.004	0.00
Fork Lift	291	0.900	0.68	2.761	2.09	0.004	0.00	0.165	0.12	0.170	0.13	0.231	0.17	291	0.799	0.60	2.421	1.83	0.004	0.00
Generator Set Gas	291	2.930	0.79	4.023	1.08	0.005	0.00	0.360	0.10	0.371	0.10	0.359	0.10	291	2.663	0.72	3.866	1.04	0.005	0.00
Generator Set Diesel	291	2.930	1.58	4.023	2.17	0.005	0.00	0.360	0.19	0.371	0.20	0.359	0.19	291	2.663	1.43	3.866	2.08	0.005	0.00
General Utility Truck	291	0.444	0.23	1.535	0.81	0.004	0.00	0.080	0.04	0.083	0.04	0.158	0.08	291	0.274	0.15	1.135	0.60	0.004	0.00
Grader	0	0.993	0.00	2.375	0.00	0.004	0.00	0.228	0.00	0.235	0.00	0.212	0.00	0	0.858	0.00	1.990	0.00	0.004	0.00
Grinder	0	0.963	0.00	2.973	0.00	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	0	0.862	0.00	2.626	0.00	0.004	0.00
Light Plants	291	2.483	0.48	4.529	0.87	0.005	0.00	0.434	0.08	0.447	0.09	0.500	0.10	291	2.312	0.45	4.208	0.81	0.005	0.00
Lift	291	3.131	0.95	3.612	1.09	0.005	0.00	0.420	0.13	0.433	0.13	0.357	0.11	291	2.858	0.87	3.240	0.98	0.005	0.00
Loader	218	2.381	0.25	4.485	0.47	0.005	0.00	0.419	0.04	0.432	0.05	0.672	0.07	218	2.116	0.22	4.099	0.43	0.005	0.00
Paver	55	1.045	0.01	2.604	0.03	0.004	0.00	0.232	0.00	0.239	0.00	0.230	0.00	55	0.920	0.01	2.232	0.03	0.004	0.00
Paving Equipment	55	1.204	0.01	3.116	0.04	0.005	0.00	0.250	0.00	0.258	0.00	0.268	0.00	55	1.084	0.01	2.748	0.03	0.004	0.00
Pickup Truck	291	0.738	0.39	1.748	0.93	0.004	0.00	0.177	0.09	0.182	0.10	0.171	0.09	291	0.519	0.28	1.317	0.70	0.004	0.00
Pile Driver	109	1.469	0.27	4.815	0.90	0.005	0.00	0.217	0.04	0.224	0.04	0.334	0.06	109	1.358	0.25	4.496	0.84	0.005	0.00
Pump	291	3.131	0.47	3.612	0.55	0.005	0.00	0.420	0.06	0.433	0.07	0.357	0.05	291	2.858	0.43	3.240	0.49	0.005	0.00
Roller	0	1.084	0.00	2.740	0.00	0.005	0.00	0.236	0.00	0.243	0.00	0.240	0.00	0	0.961	0.00	2.376	0.00	0.004	0.00
Scraper	0	1.149	0.00	2.906	0.00	0.004	0.00	0.154	0.00	0.158	0.00	0.187	0.00	0	1.025	0.00	2.577	0.00	0.004	0.00
Signal Board	291	2.483	0.48	4.529	0.87	0.005	0.00	0.434	0.08	0.447	0.09	0.500	0.10	291	2.312	0.45	4.208	0.81	0.005	0.00
Street Sweepers	291	0.963	0.46	2.973	1.41	0.004	0.00	0.178	0.08	0.184	0.09	0.244	0.12	291	0.862	0.41	2.626	1.24	0.004	0.00
Trencher	0	1.241	0.00	3.230	0.00	0.005	0.00	0.255	0.00	0.263	0.00	0.276	0.00	0	1.122	0.00	2.872	0.00	0.004	0.00
Vibratory Hammer	109	1.739	0.33	3.917	0.75	0.005	0.00	0.226	0.04	0.233	0.04	0.260	0.05	109	1.560	0.30	3.581	0.69	0.005	0.00
Water Truck	291	0.444	0.23	1.535	0.81	0.004	0.00	0.080	0.04	0.083	0.04	0.158	0.08	291	0.274	0.15</td				

Portage Bay Area

Equipment Type	2015 (cont.)						2016												
	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2016	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.808	0.01	0.833	0.01	0.973	0.01	55	5.288	0.04	4.285	0.03	0.006	0.00	0.741	0.01	0.764	0.01	0.883	0.01
Boom Truck	0.044	0.01	0.046	0.01	0.148	0.04	145	0.203	0.05	0.859	0.20	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.03
Compactor *	0.159	0.00	0.163	0.00	0.228	0.00	0	0.769	0.00	2.307	0.00	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Compressor	0.231	0.07	0.238	0.07	0.254	0.07	291	0.994	0.28	2.493	0.71	0.004	0.00	0.210	0.06	0.216	0.06	0.236	0.07
Compressor	0.231	0.07	0.238	0.07	0.254	0.07	291	0.994	0.28	2.493	0.71	0.004	0.00	0.210	0.06	0.216	0.06	0.236	0.07
Concrete pump	0.204	0.04	0.210	0.04	0.240	0.05	145	1.419	0.28	3.284	0.65	0.004	0.00	0.186	0.04	0.192	0.04	0.227	0.05
Concrete Saw	0.159	0.00	0.163	0.00	0.228	0.00	36	0.769	0.01	2.307	0.04	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Cement Mixer	0.178	0.10	0.184	0.11	0.311	0.18	145	1.209	0.70	4.171	2.42	0.004	0.00	0.164	0.09	0.169	0.10	0.292	0.17
Crane	0.120	0.36	0.124	0.37	0.203	0.60	291	0.743	2.21	2.888	8.60	0.004	0.01	0.109	0.32	0.112	0.33	0.194	0.58
Dozer/CAT	0.202	0.00	0.208	0.00	0.195	0.00	18	0.738	0.00	1.703	0.01	0.004	0.00	0.171	0.00	0.176	0.00	0.182	0.00
Drill Rig	0.200	0.02	0.206	0.02	0.314	0.03	55	1.253	0.12	4.190	0.39	0.004	0.00	0.185	0.02	0.190	0.02	0.295	0.03
Dump Truck	0.099	0.01	0.103	0.01	0.156	0.01	55	0.499	0.04	1.330	0.10	0.004	0.00	0.076	0.01	0.079	0.01	0.151	0.01
Excavator	0.187	0.01	0.193	0.01	0.183	0.01	55	0.650	0.02	1.492	0.05	0.004	0.00	0.150	0.00	0.155	0.00	0.171	0.01
Fork Lift	0.147	0.11	0.152	0.11	0.215	0.16	291	0.705	0.53	2.111	1.60	0.004	0.00	0.131	0.10	0.135	0.10	0.200	0.15
Generator Set Gas	0.318	0.09	0.328	0.09	0.326	0.09	291	2.408	0.65	3.719	1.00	0.005	0.00	0.278	0.07	0.286	0.08	0.295	0.08
Generator Set Diesel	0.318	0.17	0.328	0.18	0.326	0.18	291	2.408	1.30	3.719	2.00	0.005	0.00	0.278	0.15	0.286	0.15	0.295	0.16
General Utility Truck	0.044	0.02	0.046	0.02	0.148	0.08	291	0.203	0.11	0.859	0.45	0.004	0.00	0.029	0.02	0.030	0.02	0.144	0.08
Grader	0.201	0.00	0.207	0.00	0.193	0.00	0	0.726	0.00	1.669	0.00	0.004	0.00	0.168	0.00	0.174	0.00	0.180	0.00
Grinder	0.159	0.00	0.163	0.00	0.228	0.00	0	0.769	0.00	2.307	0.00	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Light Plants	0.400	0.08	0.413	0.08	0.463	0.09	291	2.148	0.41	3.899	0.75	0.005	0.00	0.368	0.07	0.379	0.07	0.428	0.08
Lift	0.376	0.11	0.388	0.12	0.325	0.10	291	2.596	0.79	2.885	0.87	0.005	0.00	0.334	0.10	0.344	0.10	0.294	0.09
Loader	0.383	0.04	0.394	0.04	0.613	0.06	218	1.930	0.20	3.763	0.40	0.005	0.00	0.352	0.04	0.362	0.04	0.567	0.06
Paver	0.209	0.00	0.215	0.00	0.210	0.00	55	0.803	0.01	1.892	0.02	0.004	0.00	0.185	0.00	0.191	0.00	0.192	0.00
Paving Equipment	0.227	0.00	0.234	0.00	0.249	0.00	55	0.971	0.01	2.426	0.03	0.004	0.00	0.207	0.00	0.213	0.00	0.231	0.00
Pickup Truck	0.118	0.06	0.122	0.06	0.158	0.08	291	0.322	0.17	0.933	0.49	0.004	0.00	0.063	0.03	0.065	0.03	0.148	0.08
Pile Driver	0.200	0.04	0.206	0.04	0.314	0.06	109	1.253	0.23	4.190	0.78	0.004	0.00	0.185	0.03	0.190	0.04	0.295	0.05
Pump	0.376	0.06	0.388	0.06	0.325	0.05	291	2.596	0.39	2.885	0.44	0.005	0.00	0.334	0.05	0.344	0.05	0.294	0.04
Roller	0.213	0.00	0.220	0.00	0.221	0.00	0	0.845	0.00	2.041	0.00	0.004	0.00	0.191	0.00	0.197	0.00	0.203	0.00
Scraper	0.140	0.00	0.144	0.00	0.179	0.00	0	0.911	0.00	2.271	0.00	0.004	0.00	0.127	0.00	0.131	0.00	0.172	0.00
Signal Board	0.400	0.08	0.413	0.08	0.463	0.09	291	2.148	0.41	3.899	0.75	0.005	0.00	0.368	0.07	0.379	0.07	0.428	0.08
Street Sweepers	0.159	0.07	0.163	0.08	0.228	0.11	291	0.769	0.36	2.307	1.09	0.004	0.00	0.141	0.07	0.145	0.07	0.214	0.10
Trencher	0.233	0.00	0.240	0.00	0.257	0.00	0	1.011	0.00	2.537	0.00	0.004	0.00	0.212	0.00	0.218	0.00	0.240	0.00
Vibratory Hammer	0.204	0.04	0.210	0.04	0.240	0.05	109	1.419	0.27	3.284	0.63	0.004	0.00	0.186	0.04	0.192	0.04	0.227	0.04
Water Truck	0.044	0.02	0.046	0.02	0.148	0.08	291	0.203	0.11	0.859	0.45	0.004	0.00	0.029	0.02	0.030	0.02	0.144	0.08
Welders	0.318	0.02	0.328	0.02	0.326	0.02	291	2.408	0.16	3.719	0.25	0.005	0.00	0.278	0.02	0.286	0.02	0.295	0.02
Tug Boat	0.200	0.00	0.210</td																

Portage Bay Area

Equipment Type	2017												2018							
	Working Days in 2017	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2018	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)
Backhoe	55	4.895	0.04	3.940	0.03	0.006	0.00	0.678	0.01	0.699	0.01	0.799	0.01	55	4.557	0.03	3.625	0.03	0.006	0.00
Boom Truck	145	0.163	0.04	0.633	0.15	0.004	0.00	0.021	0.00	0.021	0.01	0.142	0.03	145	0.139	0.03	0.446	0.11	0.004	0.00
Compactor *	0	0.682	0.00	2.026	0.00	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	0	0.600	0.00	1.767	0.00	0.004	0.00
Compressor	291	0.890	0.25	2.197	0.62	0.004	0.00	0.190	0.05	0.196	0.06	0.220	0.06	291	0.791	0.22	1.922	0.55	0.004	0.00
Compressor	291	0.890	0.25	2.197	0.62	0.004	0.00	0.190	0.05	0.196	0.06	0.220	0.06	291	0.791	0.22	1.922	0.55	0.004	0.00
Concrete pump	145	1.290	0.26	3.003	0.60	0.004	0.00	0.170	0.03	0.176	0.03	0.215	0.04	145	1.171	0.23	2.737	0.54	0.004	0.00
Concrete Saw	36	0.682	0.01	2.026	0.04	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	36	0.600	0.01	1.767	0.03	0.004	0.00
Cement Mixer	145	1.112	0.64	3.877	2.25	0.004	0.00	0.150	0.09	0.155	0.09	0.275	0.16	145	1.019	0.59	3.594	2.08	0.004	0.00
Crane	291	0.668	1.99	2.583	7.69	0.004	0.01	0.098	0.29	0.101	0.30	0.186	0.55	291	0.602	1.79	2.313	6.89	0.004	0.01
Dozer/CAT	18	0.612	0.00	1.411	0.01	0.004	0.00	0.139	0.00	0.143	0.00	0.171	0.00	18	0.492	0.00	1.155	0.00	0.004	0.00
Drill Rig	55	1.152	0.11	3.895	0.36	0.004	0.00	0.170	0.02	0.175	0.02	0.277	0.03	55	1.056	0.10	3.611	0.34	0.004	0.00
Dump Truck	55	0.372	0.03	1.060	0.08	0.004	0.00	0.054	0.00	0.055	0.00	0.147	0.01	55	0.266	0.02	0.825	0.06	0.004	0.00
Excavator	55	0.510	0.02	1.201	0.04	0.004	0.00	0.113	0.00	0.117	0.00	0.161	0.01	55	0.380	0.01	0.940	0.03	0.004	0.00
Fork Lift	291	0.617	0.47	1.826	1.38	0.004	0.00	0.116	0.09	0.120	0.09	0.187	0.14	291	0.535	0.40	1.582	1.20	0.004	0.00
Generator Set Gas	291	2.163	0.58	3.585	0.97	0.005	0.00	0.241	0.06	0.248	0.07	0.268	0.07	291	1.930	0.52	3.473	0.94	0.005	0.00
Generator Set Diesel	291	2.163	1.17	3.585	1.93	0.005	0.00	0.241	0.13	0.248	0.13	0.268	0.14	291	1.930	1.04	3.473	1.87	0.005	0.00
General Utility Truck	291	0.163	0.09	0.633	0.34	0.004	0.00	0.021	0.01	0.021	0.01	0.142	0.08	291	0.139	0.07	0.446	0.24	0.004	0.00
Grader	0	0.598	0.00	1.378	0.00	0.004	0.00	0.136	0.00	0.140	0.00	0.169	0.00	0	0.477	0.00	1.122	0.00	0.004	0.00
Grinder	0	0.682	0.00	2.026	0.00	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	0	0.600	0.00	1.767	0.00	0.004	0.00
Light Plants	291	1.990	0.38	3.602	0.70	0.005	0.00	0.336	0.06	0.346	0.07	0.394	0.08	291	1.841	0.36	3.319	0.64	0.005	0.00
Lift	291	2.344	0.71	2.551	0.77	0.005	0.00	0.295	0.09	0.304	0.09	0.267	0.08	291	2.103	0.64	2.246	0.68	0.005	0.00
Loader	218	1.765	0.19	3.447	0.36	0.005	0.00	0.322	0.03	0.332	0.03	0.524	0.06	218	1.615	0.17	3.146	0.33	0.005	0.00
Paver	55	0.690	0.01	1.607	0.02	0.004	0.00	0.158	0.00	0.163	0.00	0.181	0.00	55	0.581	0.01	1.349	0.02	0.004	0.00
Paving Equipment	55	0.866	0.01	2.127	0.03	0.004	0.00	0.187	0.00	0.193	0.00	0.215	0.00	55	0.767	0.01	1.851	0.02	0.004	0.00
Pickup Truck	291	0.239	0.13	0.675	0.36	0.004	0.00	0.039	0.02	0.040	0.02	0.144	0.08	291	0.192	0.10	0.472	0.25	0.004	0.00
Pile Driver	109	1.152	0.21	3.895	0.73	0.004	0.00	0.170	0.03	0.175	0.03	0.277	0.05	109	1.056	0.20	3.611	0.67	0.004	0.00
Pump	291	2.344	0.35	2.551	0.39	0.005	0.00	0.295	0.04	0.304	0.05	0.267	0.04	291	2.103	0.32	2.246	0.34	0.005	0.00
Roller	0	0.738	0.00	1.735	0.00	0.004	0.00	0.169	0.00	0.174	0.00	0.187	0.00	0	0.635	0.00	1.481	0.00	0.004	0.00
Scraper	0	0.805	0.00	1.986	0.00	0.004	0.00	0.114	0.00	0.118	0.00	0.166	0.00	0	0.705	0.00	1.720	0.00	0.004	0.00
Signal Board	291	1.990	0.38	3.602	0.70	0.005	0.00	0.336	0.06	0.346	0.07	0.394	0.08	291	1.841	0.36	3.319	0.64	0.005	0.00
Street Sweepers	291	0.682	0.32	2.026	0.96	0.004	0.00	0.126	0.06	0.129	0.06	0.200	0.09	291	0.600	0.28	1.767	0.84	0.004	0.00
Trencher	0	0.907	0.00	2.242	0.00	0.004	0.00	0.193	0.00	0.199	0.00	0.223	0.00	0	0.809	0.00	1.968	0.00	0.004	0.00
Vibratory Hammer	109	1.290	0.25	3.003	0.58	0.004	0.00	0.170	0.03	0.176	0.03	0.215	0.04	109	1.171	0.22	2.737	0.52	0.004	0.00
Water Truck	291	0.163	0.09	0.633	0.34	0.004	0.00	0.021	0.01	0.021	0.01	0.142	0.08	291	0.139	0.07				

## Portage Bay Area

Equipment Type	2018 (cont.)					
	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.623	0.00	0.642	0.00	0.731	0.01
Boom Truck	0.015	0.00	0.016	0.00	0.140	0.03
Compactor *	0.111	0.00	0.115	0.00	0.187	0.00
Compressor	0.172	0.05	0.177	0.05	0.205	0.06
Compressor	0.172	0.05	0.177	0.05	0.205	0.06
Concrete pump	0.155	0.03	0.160	0.03	0.206	0.04
Concrete Saw	0.111	0.00	0.115	0.00	0.187	0.00
Cement Mixer	0.137	0.08	0.141	0.08	0.258	0.15
Crane	0.089	0.26	0.091	0.27	0.179	0.53
Dozer/CAT	0.108	0.00	0.111	0.00	0.162	0.00
Drill Rig	0.155	0.01	0.160	0.01	0.260	0.02
Dump Truck	0.034	0.00	0.035	0.00	0.143	0.01
Excavator	0.078	0.00	0.080	0.00	0.153	0.00
Fork Lift	0.100	0.08	0.103	0.08	0.177	0.13
Generator Set Gas	0.211	0.06	0.217	0.06	0.244	0.07
Generator Set Diesel	0.211	0.11	0.217	0.12	0.244	0.13
General Utility Truck	0.015	0.01	0.016	0.01	0.140	0.07
Grader	0.104	0.00	0.107	0.00	0.161	0.00
Grinder	0.111	0.00	0.115	0.00	0.187	0.00
Light Plants	0.306	0.06	0.315	0.06	0.363	0.07
Lift	0.263	0.08	0.271	0.08	0.243	0.07
Loader	0.294	0.03	0.303	0.03	0.485	0.05
Paver	0.130	0.00	0.134	0.00	0.171	0.00
Paving Equipment	0.169	0.00	0.174	0.00	0.200	0.00
Pickup Truck	0.026	0.01	0.027	0.01	0.142	0.08
Pile Driver	0.155	0.03	0.160	0.03	0.260	0.05
Pump	0.263	0.04	0.271	0.04	0.243	0.04
Roller	0.144	0.00	0.148	0.00	0.177	0.00
Scraper	0.102	0.00	0.105	0.00	0.161	0.00
Signal Board	0.306	0.06	0.315	0.06	0.363	0.07
Street Sweepers	0.111	0.05	0.115	0.05	0.187	0.09
Trencher	0.174	0.00	0.180	0.00	0.208	0.00
Vibratory Hammer	0.155	0.03	0.160	0.03	0.206	0.04
Water Truck	0.015	0.01	0.016	0.01	0.140	0.07
Welders	0.211	0.01	0.217	0.01	0.244	0.02
Tug Boat	0.200	0.00	0.210	0.00	0.250	0.00
Floating Derrick Crane	0.155	0.04	0.160	0.04	0.206	0.05
<b>Total Emissions by Year</b>	1.22		1.25		2.03	



Montlake Area and New Bascule Bridge

Equipment Type	Horsepower (hp)	Utilization Factor (%)	Load	# of Equipment	Montlake		2013												
					Working Days	Hours per Day	Working Days in 2013	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	100	0.3	0.21	1	600	20	29	6.569	0.03	5.413	0.02	0.006	0.00	0.945	0.00	0.974	0.00	1.165	0.00
Boom Truck	250	0.5	0.59	1	1200	20	57	0.631	0.06	1.984	0.18	0.004	0.00	0.118	0.01	0.122	0.01	0.171	0.02
Compactor *	200	0.2	0.43	1	200	20	10	1.071	0.00	3.339	0.01	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Compressor	150	0.5	0.59	1	1200	20	57	1.353	0.08	3.569	0.20	0.005	0.00	0.277	0.02	0.285	0.02	0.293	0.02
Compressor	150	0.5	0.59	1	1200	20	57	1.353	0.08	3.569	0.20	0.005	0.00	0.277	0.02	0.285	0.02	0.293	0.02
Concrete pump	350	0.3	0.59	1	600	20	29	1.931	0.08	4.272	0.17	0.005	0.00	0.250	0.01	0.258	0.01	0.282	0.01
Concrete Saw	200	0.2	0.59	1	300	20	14	1.353	0.01	3.569	0.03	0.005	0.00	0.277	0.00	0.285	0.00	0.293	0.00
Cement Mixer	350	0.3	0.43	4	600	20	29	1.530	0.17	5.124	0.58	0.005	0.00	0.210	0.02	0.216	0.02	0.351	0.04
Crane	600	0.6	0.43	1	1200	20	57	0.999	0.19	3.917	0.76	0.005	0.00	0.147	0.03	0.151	0.03	0.225	0.04
Dozer/CAT	150	0.1	0.59	1	300	20	14	1.136	0.00	2.826	0.01	0.005	0.00	0.254	0.00	0.261	0.00	0.236	0.00
Drill Rig	600	0.3	0.43	1	600	20	29	1.585	0.08	5.147	0.25	0.005	0.00	0.234	0.01	0.242	0.01	0.355	0.02
Dump Truck	350	0.3	0.59	5	600	20	29	0.940	0.18	2.328	0.45	0.004	0.00	0.146	0.03	0.150	0.03	0.166	0.03
Excavator	150	0.3	0.59	1	600	20	29	1.103	0.02	2.636	0.04	0.005	0.00	0.253	0.00	0.261	0.00	0.220	0.00
Fork Lift	200	0.5	0.59	2	1200	20	57	1.009	0.15	3.145	0.47	0.005	0.00	0.186	0.03	0.192	0.03	0.248	0.04
Generator Set Gas	60	0.7	1.00	1	1200	20	57	3.210	0.17	4.191	0.22	0.005	0.00	0.404	0.02	0.416	0.02	0.394	0.02
Generator Set Diesel	60	0.7	1.00	2	1200	20	57	3.210	0.34	4.191	0.44	0.005	0.00	0.404	0.04	0.416	0.04	0.394	0.04
General Utility Truck	200	0.7	0.59	1	1200	20	57	0.631	0.07	1.984	0.21	0.004	0.00	0.118	0.01	0.122	0.01	0.171	0.02
Grader	150	0.2	0.59	1	200	20	10	1.132	0.00	2.797	0.01	0.005	0.00	0.254	0.00	0.261	0.00	0.234	0.00
Grinder	300	0.1	0.59	1	100	20	5	1.071	0.00	3.339	0.01	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Light Plants	100	0.7	0.43	1	1200	20	57	2.661	0.10	4.861	0.18	0.005	0.00	0.468	0.02	0.483	0.02	0.539	0.02
Lift	100	0.8	0.59	1	1200	20	57	3.417	0.20	4.002	0.24	0.005	0.00	0.465	0.03	0.479	0.03	0.393	0.02
Loader	260	0.4	0.21	1	1200	20	57	2.669	0.07	4.892	0.13	0.005	0.00	0.458	0.01	0.472	0.01	0.736	0.02
Paver	175	0.1	0.59	1	400	20	19	1.179	0.01	3.008	0.01	0.005	0.00	0.256	0.00	0.264	0.00	0.251	0.00
Paving Equipment	175	0.1	0.59	1	400	20	19	1.333	0.01	3.505	0.02	0.005	0.00	0.274	0.00	0.282	0.00	0.288	0.00
Pickup Truck	175	0.8	0.59	1	1200	20	57	0.967	0.10	2.227	0.23	0.004	0.00	0.234	0.02	0.241	0.03	0.187	0.02
Pile Driver	600	0.3	0.43	1	300	20	14	1.585	0.04	5.147	0.13	0.005	0.00	0.234	0.01	0.242	0.01	0.355	0.01
Pump	100	0.4	0.59	1	1200	20	57	3.417	0.10	4.002	0.12	0.005	0.00	0.465	0.01	0.479	0.01	0.393	0.01
Roller	140	0.2	0.59	1	400	20	19	1.216	0.01	3.132	0.02	0.005	0.00	0.259	0.00	0.267	0.00	0.262	0.00
Scraper	350	0.1	0.59	1	0	20	0	1.287	0.00	3.264	0.00	0.005	0.00	0.169	0.00	0.174	0.00	0.196	0.00
Signal Board	100	0.7	0.43	1	1200	20	57	2.661	0.10	4.861	0.18	0.005	0.00	0.468	0.02	0.483	0.02	0.539	0.02
Street Sweepers	250	0.5	0.59	1	1200	20	57	1.071	0.10	3.339	0.31	0.005	0.00	0.199	0.02	0.205	0.02	0.261	0.02
Trencher	150	0.3	0.59	1	0	20	0	1.370	0.00	3.609	0.00	0.005	0.00	0.279	0.00	0.287	0.00	0.296	0.00
Vibratory Hammer	450	0.3	0.59	1	300	20	14	1.931	0.05	4.272	0.11	0.005	0.00	0.250	0.01	0.258	0.01	0.282	0.01
Water Truck	350	0.4	0.59	1	1200	20	57	0.631	0.07	1.984	0.21	0.004	0.00	0.118	0.01	0.122	0.01	0.171	0.02
Welders	60	0.3	0.59	1	1200	20	57	3.210	0.04	4.191	0.06	0.005	0.00	0.404	0.01	0.416	0.01	0.394	0.01
Tug Boat	2000	0.5	0.59	1	0	20	0	1.520	0.00	4.510	0.00	0.005	0.00	0.200	0.00	0.210	0.00	0.250	0.00
Floating Derrick Crane	600	0.6	0.59	1	0	20	0	1.931	0.00	4.272	0.00	0.005	0.00	0.250	0.00	0.258	0.00	0.282	0.00
<b>Total Emissions by Year</b>								2.70		6.22		0.01		0.43	</				

Montlake Area and New Bascule Bridge

Equipment Type	2014												2015											
	Working Days in 2014	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2015	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)			
Backhoe	114	6.128	0.10	5.021	0.08	0.006	0.00	0.876	0.01	0.903	0.01	1.067	0.02	114	5.700	0.09	4.645	0.07	0.006	0.00	0.808			
Boom Truck	229	0.444	0.16	1.535	0.57	0.004	0.00	0.080	0.03	0.083	0.03	0.158	0.06	229	0.274	0.10	1.135	0.42	0.004	0.00	0.044			
Compactor *	38	0.963	0.01	2.973	0.04	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	38	0.862	0.01	2.626	0.04	0.004	0.00	0.159			
Compressor	229	1.225	0.27	3.188	0.71	0.005	0.00	0.254	0.06	0.261	0.06	0.273	0.06	229	1.106	0.25	2.827	0.63	0.004	0.00	0.231			
Compressor	229	1.225	0.27	3.188	0.71	0.005	0.00	0.254	0.06	0.261	0.06	0.273	0.06	229	1.106	0.25	2.827	0.63	0.004	0.00	0.231			
Concrete pump	114	1.739	0.27	3.917	0.61	0.005	0.00	0.226	0.04	0.233	0.04	0.260	0.04	114	1.560	0.24	3.581	0.56	0.005	0.00	0.204			
Concrete Saw	57	0.963	0.03	2.973	0.09	0.004	0.00	0.178	0.01	0.184	0.01	0.244	0.01	57	0.862	0.03	2.626	0.08	0.004	0.00	0.159			
Cement Mixer	114	1.418	0.65	4.793	2.18	0.005	0.00	0.193	0.09	0.199	0.09	0.331	0.15	114	1.311	0.60	4.475	2.04	0.005	0.00	0.178			
Crane	229	0.908	0.71	3.555	2.77	0.005	0.00	0.133	0.10	0.137	0.11	0.213	0.17	229	0.823	0.64	3.213	2.51	0.004	0.00	0.120			
Dozer/CAT	57	1.000	0.01	2.408	0.03	0.004	0.00	0.228	0.00	0.235	0.00	0.214	0.00	57	0.867	0.01	2.022	0.02	0.004	0.00	0.202			
Drill Rig	114	1.469	0.29	4.815	0.94	0.005	0.00	0.217	0.04	0.224	0.04	0.334	0.07	114	1.358	0.26	4.496	0.88	0.005	0.00	0.200			
Dump Truck	114	0.783	0.61	1.955	1.53	0.004	0.00	0.123	0.10	0.127	0.10	0.161	0.13	114	0.637	0.50	1.627	1.27	0.004	0.00	0.099			
Excavator	114	0.949	0.06	2.191	0.15	0.004	0.00	0.223	0.01	0.230	0.02	0.197	0.01	114	0.797	0.05	1.824	0.12	0.004	0.00	0.187			
Fork Lift	229	0.900	0.54	2.761	1.64	0.004	0.00	0.165	0.10	0.170	0.10	0.231	0.14	229	0.799	0.48	2.421	1.44	0.004	0.00	0.147			
Generator Set Gas	229	2.930	0.62	4.023	0.85	0.005	0.00	0.360	0.08	0.371	0.08	0.359	0.08	229	2.663	0.56	3.866	0.82	0.005	0.00	0.318			
Generator Set Diesel	229	2.930	1.24	4.023	1.70	0.005	0.00	0.360	0.15	0.371	0.16	0.359	0.15	229	2.663	1.13	3.866	1.64	0.005	0.00	0.318			
General Utility Truck	229	0.444	0.18	1.535	0.64	0.004	0.00	0.080	0.03	0.083	0.03	0.158	0.07	229	0.274	0.11	1.135	0.47	0.004	0.00	0.044			
Grader	38	0.993	0.01	2.375	0.04	0.004	0.00	0.228	0.00	0.235	0.00	0.212	0.00	38	0.858	0.01	1.990	0.03	0.004	0.00	0.201			
Grinder	19	0.963	0.01	2.973	0.02	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	19	0.862	0.01	2.626	0.02	0.004	0.00	0.159			
Light Plants	229	2.483	0.38	4.529	0.69	0.005	0.00	0.434	0.07	0.447	0.07	0.500	0.08	229	2.312	0.35	4.208	0.64	0.005	0.00	0.400			
Lift	229	3.131	0.74	3.612	0.86	0.005	0.00	0.420	0.10	0.433	0.10	0.357	0.08	229	2.858	0.68	3.240	0.77	0.005	0.00	0.376			
Loader	229	2.381	0.26	4.485	0.49	0.005	0.00	0.419	0.05	0.432	0.05	0.672	0.07	229	2.116	0.23	4.099	0.45	0.005	0.00	0.383			
Paver	76	1.045	0.02	2.604	0.05	0.004	0.00	0.232	0.00	0.239	0.00	0.230	0.00	76	0.920	0.02	2.232	0.04	0.004	0.00	0.209			
Paving Equipment	76	1.204	0.02	3.116	0.05	0.005	0.00	0.250	0.00	0.258	0.00	0.268	0.00	76	1.084	0.02	2.748	0.05	0.004	0.00	0.227			
Pickup Truck	229	0.738	0.31	1.748	0.73	0.004	0.00	0.177	0.07	0.182	0.08	0.171	0.07	229	0.519	0.22	1.317	0.55	0.004	0.00	0.118			
Pile Driver	57	1.469	0.14	4.815	0.47	0.005	0.00	0.217	0.02	0.224	0.02	0.334	0.03	57	1.358	0.13	4.496	0.44	0.005	0.00	0.200			
Pump	229	3.131	0.37	3.612	0.43	0.005	0.00	0.420	0.05	0.433	0.05	0.357	0.04	229	2.858	0.34	3.240	0.39	0.005	0.00	0.376			
Roller	76	1.084	0.03	2.740	0.08	0.005	0.00	0.236	0.01	0.243	0.01	0.240	0.01	76	0.961	0.03	2.376	0.07	0.004	0.00	0.213			
Scraper	0	1.149	0.00	2.906	0.00	0.004	0.00	0.154	0.00	0.158	0.00	0.187	0.00	0	1.025	0.00	2.577	0.00	0.004	0.00	0.140			
Signal Board	229	2.483	0.38	4.529	0.69	0.005	0.00	0.434	0.07	0.447	0.07	0.500	0.08	229	2.312	0.35	4.208	0.64	0.005	0.00	0.400			
Street Sweepers	229	0.963	0.36	2.973	1.10	0.004	0.00	0.178	0.07	0.184	0.07	0.244	0.09	229	0.862	0.32	2.626	0.98	0.004	0.00	0.159			
Trencher	0	1.241	0.00	3.230	0.00	0.005	0.00	0.255	0.00	0.263	0.00	0.276	0.00	0	1.122</td									

Montlake Area and New Bascule Bridge

Equipment Type	2015 (cont.)					2016												
	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2016	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.01	0.833	0.01	0.973	0.02	114	5.288	0.08	4.285	0.07	0.006	0.00	0.741	0.01	0.764	0.01	0.883	0.01
Boom Truck	0.02	0.046	0.02	0.148	0.06	229	0.203	0.08	0.859	0.32	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.05
Compactor *	0.00	0.163	0.00	0.228	0.00	38	0.769	0.01	2.307	0.03	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Compressor	0.05	0.238	0.05	0.254	0.06	229	0.994	0.22	2.493	0.56	0.004	0.00	0.210	0.05	0.216	0.05	0.236	0.05
Concrete pump	0.03	0.210	0.03	0.240	0.04	114	1.419	0.22	3.284	0.51	0.004	0.00	0.186	0.03	0.192	0.03	0.227	0.04
Concrete Saw	0.00	0.163	0.00	0.228	0.01	57	0.769	0.02	2.307	0.07	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.01
Cement Mixer	0.08	0.184	0.08	0.311	0.14	114	1.209	0.55	4.171	1.90	0.004	0.00	0.164	0.07	0.169	0.08	0.292	0.13
Crane	0.09	0.124	0.10	0.203	0.16	229	0.743	0.58	2.888	2.25	0.004	0.00	0.109	0.08	0.112	0.09	0.194	0.15
Dozer/CAT	0.00	0.208	0.00	0.195	0.00	57	0.738	0.01	1.703	0.02	0.004	0.00	0.171	0.00	0.176	0.00	0.182	0.00
Drill Rig	0.04	0.206	0.04	0.314	0.06	114	1.253	0.24	4.190	0.82	0.004	0.00	0.185	0.04	0.190	0.04	0.295	0.06
Dump Truck	0.08	0.103	0.08	0.156	0.12	114	0.499	0.39	1.330	1.04	0.004	0.00	0.076	0.06	0.079	0.06	0.151	0.12
Excavator	0.01	0.193	0.01	0.183	0.01	114	0.650	0.04	1.492	0.10	0.004	0.00	0.150	0.01	0.155	0.01	0.171	0.01
Fork Lift	0.09	0.152	0.09	0.215	0.13	229	0.705	0.42	2.111	1.25	0.004	0.00	0.131	0.08	0.135	0.08	0.200	0.12
Generator Set Gas	0.07	0.328	0.07	0.326	0.07	229	2.408	0.51	3.719	0.79	0.005	0.00	0.278	0.06	0.286	0.06	0.295	0.06
Generator Set Diesel	0.13	0.328	0.14	0.326	0.14	229	2.408	1.02	3.719	1.57	0.005	0.00	0.278	0.12	0.286	0.12	0.295	0.13
General Utility Truck	0.02	0.046	0.02	0.148	0.06	229	0.203	0.08	0.859	0.36	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.06
Grader	0.00	0.207	0.00	0.193	0.00	38	0.726	0.01	1.669	0.02	0.004	0.00	0.168	0.00	0.174	0.00	0.180	0.00
Grinder	0.00	0.163	0.00	0.228	0.00	19	0.769	0.01	2.307	0.02	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Light Plants	0.06	0.413	0.06	0.463	0.07	229	2.148	0.33	3.899	0.59	0.005	0.00	0.368	0.06	0.379	0.06	0.428	0.06
Lift	0.09	0.388	0.09	0.325	0.08	229	2.596	0.62	2.885	0.69	0.005	0.00	0.334	0.08	0.344	0.08	0.294	0.07
Loader	0.04	0.394	0.04	0.613	0.07	229	1.930	0.21	3.763	0.41	0.005	0.00	0.352	0.04	0.362	0.04	0.567	0.06
Paver	0.00	0.215	0.00	0.210	0.00	76	0.803	0.01	1.892	0.03	0.004	0.00	0.185	0.00	0.191	0.00	0.192	0.00
Paving Equipment	0.00	0.234	0.00	0.249	0.00	76	0.971	0.02	2.426	0.04	0.004	0.00	0.207	0.00	0.213	0.00	0.231	0.00
Pickup Truck	0.05	0.122	0.05	0.158	0.07	229	0.322	0.13	0.933	0.39	0.004	0.00	0.063	0.03	0.065	0.03	0.148	0.06
Pile Driver	0.02	0.206	0.02	0.314	0.03	57	1.253	0.12	4.190	0.41	0.004	0.00	0.185	0.02	0.190	0.02	0.295	0.03
Pump	0.04	0.388	0.05	0.325	0.04	229	2.596	0.31	2.885	0.34	0.005	0.00	0.334	0.04	0.344	0.04	0.294	0.03
Roller	0.01	0.220	0.01	0.221	0.01	76	0.845	0.02	2.041	0.06	0.004	0.00	0.191	0.01	0.197	0.01	0.203	0.01
Scraper	0.00	0.144	0.00	0.179	0.00	0	0.911	0.00	2.271	0.00	0.004	0.00	0.127	0.00	0.131	0.00	0.172	0.00
Signal Board	0.06	0.413	0.06	0.463	0.07	229	2.148	0.33	3.899	0.59	0.005	0.00	0.368	0.06	0.379	0.06	0.428	0.06
Street Sweepers	0.06	0.163	0.06	0.228	0.08	229	0.769	0.29	2.307	0.86	0.004	0.00	0.141	0.05	0.145	0.05	0.214	0.08
Trencher	0.00	0.240	0.00	0.257	0.00	0	1.011	0.00	2.537	0.00	0.004	0.00	0.212	0.00	0.218	0.00	0.240	0.00
Vibratory Hammer	0.02	0.210	0.02	0.240	0.02	57	1.419	0.14	3.284	0.33	0.004	0.00	0.186	0.02	0.192	0.02	0.227	0.02
Water Truck	0.02	0.046	0.02	0.148	0.06	229	0.203	0.08	0.859	0.36	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.06
Welders	0.02	0.328	0.02	0.326	0.02	229	2.408	0.13	3.719	0.20	0.005	0.00	0.278	0.01	0.286	0.02	0.295	0.02
Tug Boat	0.00	0.210	0.00	0.250	0.00	0	1.520	0.00	4.510	0.00	0.005	0.00	0.200	0.00	0.210	0.00	0.250	0.00
Floating Derrick Crane	0.00	0.210	0.00	0.240	0.00	0	1.419	0.00	3.284	0.00	0.004	0.00	0.186	0.00	0.192	0.00	0.227	0.00
<b>Total Emissions by Year</b>	<b>1.28</b>		<b>1.32</b>		<b>1.75</b>		<b>7.46</b>		<b>17.55</b>		<b>0.03</b>		<b>1.11</b>		<b>1.15</b>		<b>1.64</b>	

Montlake Area and New Bascule Bridge

Equipment Type	2017												2018											
	Working Days in 2017	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2018	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)			
Backhoe	114	4.895	0.08	3.940	0.06	0.006	0.00	0.678	0.01	0.699	0.01	0.799	0.01	114	4.557	0.07	3.625	0.06	0.006	0.00	0.00	0.623		
Boom Truck	229	0.163	0.06	0.633	0.24	0.004	0.00	0.021	0.01	0.021	0.01	0.142	0.05	229	0.139	0.05	0.446	0.17	0.004	0.00	0.00	0.015		
Compactor *	38	0.682	0.01	2.026	0.03	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	38	0.600	0.01	1.767	0.03	0.004	0.00	0.00	0.111		
Compressor	229	0.890	0.20	2.197	0.49	0.004	0.00	0.190	0.04	0.196	0.04	0.220	0.05	229	0.791	0.18	1.922	0.43	0.004	0.00	0.00	0.172		
Compressor	229	0.890	0.20	2.197	0.49	0.004	0.00	0.190	0.04	0.196	0.04	0.220	0.05	229	0.791	0.18	1.922	0.43	0.004	0.00	0.00	0.172		
Concrete pump	114	1.290	0.20	3.003	0.47	0.004	0.00	0.170	0.03	0.176	0.03	0.215	0.03	114	1.171	0.18	2.737	0.43	0.004	0.00	0.00	0.155		
Concrete Saw	57	0.682	0.02	2.026	0.06	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.01	57	0.600	0.02	1.767	0.05	0.004	0.00	0.00	0.111		
Cement Mixer	114	1.112	0.51	3.877	1.76	0.004	0.00	0.150	0.07	0.155	0.07	0.275	0.13	114	1.019	0.46	3.594	1.64	0.004	0.00	0.00	0.137		
Crane	229	0.668	0.52	2.583	2.01	0.004	0.00	0.098	0.08	0.101	0.08	0.186	0.14	229	0.602	0.47	2.313	1.80	0.004	0.00	0.00	0.089		
Dozer/CAT	57	0.612	0.01	1.411	0.02	0.004	0.00	0.139	0.00	0.143	0.00	0.171	0.00	57	0.492	0.01	1.155	0.01	0.004	0.00	0.00	0.108		
Drill Rig	114	1.152	0.22	3.895	0.76	0.004	0.00	0.170	0.03	0.175	0.03	0.277	0.05	114	1.056	0.21	3.611	0.70	0.004	0.00	0.00	0.155		
Dump Truck	114	0.372	0.29	1.060	0.83	0.004	0.00	0.054	0.04	0.055	0.04	0.147	0.11	114	0.266	0.21	0.825	0.64	0.004	0.00	0.00	0.034		
Excavator	114	0.510	0.03	1.201	0.08	0.004	0.00	0.113	0.01	0.117	0.01	0.161	0.01	114	0.380	0.03	0.940	0.06	0.004	0.00	0.00	0.078		
Fork Lift	229	0.617	0.37	1.826	1.09	0.004	0.00	0.116	0.07	0.120	0.07	0.187	0.11	229	0.535	0.32	1.582	0.94	0.004	0.00	0.00	1.00		
Generator Set Gas	229	2.163	0.46	3.585	0.76	0.005	0.00	0.241	0.05	0.248	0.05	0.268	0.06	229	1.930	0.41	3.473	0.74	0.005	0.00	0.00	0.211		
Generator Set Diesel	229	2.163	0.92	3.585	1.52	0.005	0.00	0.241	0.10	0.248	0.11	0.268	0.11	229	1.930	0.82	3.473	1.47	0.005	0.00	0.00	0.211		
General Utility Truck	229	0.163	0.07	0.633	0.26	0.004	0.00	0.021	0.01	0.021	0.01	0.142	0.06	229	0.139	0.06	0.446	0.19	0.004	0.00	0.00	0.015		
Grader	38	0.598	0.01	1.378	0.02	0.004	0.00	0.136	0.00	0.140	0.00	0.169	0.00	38	0.477	0.01	1.122	0.02	0.004	0.00	0.00	0.104		
Grinder	19	0.682	0.01	2.026	0.02	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	19	0.600	0.00	1.767	0.01	0.004	0.00	0.00	0.111		
Light Plants	229	1.990	0.30	3.602	0.55	0.005	0.00	0.336	0.05	0.346	0.05	0.394	0.06	229	1.841	0.28	3.319	0.50	0.005	0.00	0.00	0.306		
Lift	229	2.344	0.56	2.551	0.61	0.005	0.00	0.295	0.07	0.304	0.07	0.267	0.06	229	2.103	0.50	2.246	0.53	0.005	0.00	0.00	0.263		
Loader	229	1.765	0.19	3.447	0.38	0.005	0.00	0.322	0.04	0.332	0.04	0.524	0.06	229	1.615	0.18	3.146	0.35	0.005	0.00	0.00	0.294		
Paver	76	0.690	0.01	1.607	0.03	0.004	0.00	0.158	0.00	0.163	0.00	0.181	0.00	76	0.581	0.01	1.349	0.02	0.004	0.00	0.00	0.130		
Paving Equipment	76	0.866	0.02	2.127	0.04	0.004	0.00	0.187	0.00	0.193	0.00	0.215	0.00	76	0.767	0.01	1.851	0.03	0.004	0.00	0.00	0.169		
Pickup Truck	229	0.239	0.10	0.675	0.28	0.004	0.00	0.039	0.02	0.040	0.02	0.144	0.06	229	0.192	0.08	0.472	0.20	0.004	0.00	0.00	0.026		
Pile Driver	57	1.152	0.11	3.895	0.38	0.004	0.00	0.170	0.02	0.175	0.02	0.277	0.03	57	1.056	0.10	3.611	0.35	0.004	0.00	0.00	0.155		
Pump	229	2.344	0.28	2.551	0.30	0.005	0.00	0.295	0.04	0.304	0.04	0.267	0.03	229	2.103	0.25	2.246	0.27	0.005	0.00	0.00	0.263		
Roller	76	0.738	0.02	1.735	0.05	0.004	0.00	0.169	0.00	0.174	0.00	0.187	0.01	76	0.635	0.02	1.481	0.04	0.004	0.00	0.00	0.144		
Scraper	0	0.805	0.00	1.986	0.00	0.004	0.00	0.114	0.00	0.118	0.00	0.166	0.00	0	0.705	0.00	1.720	0.00	0.004	0.00	0.00	0.102		
Signal Board	229	1.990	0.30	3.602	0.55	0.005	0.00	0.336	0.05	0.346	0.05	0.394	0.06	229	1.841	0.28	3.319	0.50	0.005	0.00	0.00	0.306		
Street Sweepers	229	0.682	0.25	2.026	0.75	0.004	0.00	0.126</td																

Montlake Area and New Bascule Bridge

Equipment Type	2018 (cont.)				
	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.01	0.642	0.01	0.731	0.01
Boom Truck	0.01	0.016	0.01	0.140	0.05
Compactor *	0.00	0.115	0.00	0.187	0.00
Compressor	0.04	0.177	0.04	0.205	0.05
Compressor	0.04	0.177	0.04	0.205	0.05
Concrete pump	0.02	0.160	0.03	0.206	0.03
Concrete Saw	0.00	0.115	0.00	0.187	0.01
Cement Mixer	0.06	0.141	0.06	0.258	0.12
Crane	0.07	0.091	0.07	0.179	0.14
Dozer/CAT	0.00	0.111	0.00	0.162	0.00
Drill Rig	0.03	0.160	0.03	0.260	0.05
Dump Truck	0.03	0.035	0.03	0.143	0.11
Excavator	0.01	0.080	0.01	0.153	0.01
Fork Lift	0.06	0.103	0.06	0.177	0.11
Generator Set Gas	0.04	0.217	0.05	0.244	0.05
Generator Set Diesel	0.09	0.217	0.09	0.244	0.10
General Utility Truck	0.01	0.016	0.01	0.140	0.06
Grader	0.00	0.107	0.00	0.161	0.00
Grinder	0.00	0.115	0.00	0.187	0.00
Light Plants	0.05	0.315	0.05	0.363	0.06
Lift	0.06	0.271	0.06	0.243	0.06
Loader	0.03	0.303	0.03	0.485	0.05
Paver	0.00	0.134	0.00	0.171	0.00
Paving Equipment	0.00	0.174	0.00	0.200	0.00
Pickup Truck	0.01	0.027	0.01	0.142	0.06
Pile Driver	0.02	0.160	0.02	0.260	0.03
Pump	0.03	0.271	0.03	0.243	0.03
Roller	0.00	0.148	0.00	0.177	0.00
Scraper	0.00	0.105	0.00	0.161	0.00
Signal Board	0.05	0.315	0.05	0.363	0.06
Street Sweepers	0.04	0.115	0.04	0.187	0.07
Trencher	0.00	0.180	0.00	0.208	0.00
Vibratory Hammer	0.02	0.160	0.02	0.206	0.02
Water Truck	0.01	0.016	0.01	0.140	0.06
Welders	0.01	0.217	0.01	0.244	0.01
Tug Boat	0.00	0.210	0.00	0.250	0.00
Floating Derrick Crane	0.00	0.160	0.00	0.206	0.00
<b>Total Emissions by Year</b>	<b>0.85</b>		<b>0.87</b>		<b>1.46</b>



West Approach

Equipment Type	Horsepower (hp)	Utilization Factor (%)	Load	# of Equipment	West Approach		2013												
					Working Days	Hours per Day	Working Days in 2013	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	100	0.3	0.21	1	300	20	43	6.569	0.04	5.413	0.03	0.006	0.00	0.945	0.01	0.974	0.01	1.165	0.01
Boom Truck	250	0.5	0.59	1	750	20	107	0.631	0.11	1.984	0.35	0.004	0.00	0.118	0.02	0.122	0.02	0.171	0.03
Compactor *	200	0.2	0.43	1	100	20	14	1.071	0.01	3.339	0.02	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Compressor	150	0.5	0.59	1	1500	20	214	1.353	0.28	3.569	0.75	0.005	0.00	0.277	0.06	0.285	0.06	0.293	0.06
Compressor	150	0.5	0.59	1	1500	20	214	1.353	0.28	3.569	0.75	0.005	0.00	0.277	0.06	0.285	0.06	0.293	0.06
Concrete pump	350	0.3	0.59	1	750	20	107	1.931	0.28	4.272	0.63	0.005	0.00	0.250	0.04	0.258	0.04	0.282	0.04
Concrete Saw	200	0.2	0.59	1	100	20	14	1.353	0.01	3.569	0.03	0.005	0.00	0.277	0.00	0.285	0.00	0.293	0.00
Cement Mixer	350	0.3	0.43	4	750	20	107	1.530	0.65	5.124	2.19	0.005	0.00	0.210	0.09	0.216	0.09	0.351	0.15
Crane	600	0.6	0.43	3	1500	20	214	0.999	2.19	3.917	8.59	0.005	0.01	0.147	0.32	0.151	0.33	0.225	0.49
Dozer/CAT	150	0.1	0.59	1	100	20	14	1.136	0.00	2.826	0.01	0.005	0.00	0.254	0.00	0.261	0.00	0.236	0.00
Drill Rig	600	0.3	0.43	1	400	20	57	1.585	0.15	5.147	0.50	0.005	0.00	0.234	0.02	0.242	0.02	0.355	0.03
Dump Truck	350	0.3	0.59	1	250	20	36	0.940	0.05	2.328	0.11	0.004	0.00	0.146	0.01	0.150	0.01	0.166	0.01
Excavator	150	0.3	0.59	1	250	20	36	1.103	0.02	2.636	0.06	0.005	0.00	0.253	0.01	0.261	0.01	0.220	0.00
Fork Lift	200	0.5	0.59	2	1500	20	214	1.009	0.56	3.145	1.75	0.005	0.00	0.186	0.10	0.192	0.11	0.248	0.14
Generator Set Gas	60	0.7	1.00	1	1500	20	214	3.210	0.64	4.191	0.83	0.005	0.00	0.404	0.08	0.416	0.08	0.394	0.08
Generator Set Diesel	60	0.7	1.00	2	1500	20	214	3.210	1.27	4.191	1.66	0.005	0.00	0.404	0.16	0.416	0.17	0.394	0.16
General Utility Truck	200	0.7	0.59	1	1500	20	214	0.631	0.25	1.984	0.77	0.004	0.00	0.118	0.05	0.122	0.05	0.171	0.07
Grader	150	0.2	0.59	1	0	20	0	1.132	0.00	2.797	0.00	0.005	0.00	0.254	0.00	0.261	0.00	0.234	0.00
Grinder	300	0.1	0.59	1	0	20	0	1.071	0.00	3.339	0.00	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Light Plants	100	0.7	0.43	1	1500	20	214	2.661	0.38	4.861	0.69	0.005	0.00	0.468	0.07	0.483	0.07	0.539	0.08
Lift	100	0.8	0.59	1	1500	20	214	3.417	0.76	4.002	0.89	0.005	0.00	0.465	0.10	0.479	0.11	0.393	0.09
Loader	260	0.4	0.21	1	1100	20	157	2.669	0.20	4.892	0.37	0.005	0.00	0.458	0.03	0.472	0.04	0.736	0.06
Paver	175	0.1	0.59	1	300	20	43	1.179	0.01	3.008	0.03	0.005	0.00	0.256	0.00	0.264	0.00	0.251	0.00
Paving Equipment	175	0.1	0.59	1	300	20	43	1.333	0.01	3.505	0.03	0.005	0.00	0.274	0.00	0.282	0.00	0.288	0.00
Pickup Truck	175	0.8	0.59	1	1500	20	214	0.967	0.38	2.227	0.87	0.004	0.00	0.234	0.09	0.241	0.09	0.187	0.07
Pile Driver	600	0.3	0.43	1	600	20	86	1.585	0.23	5.147	0.75	0.005	0.00	0.234	0.03	0.242	0.04	0.355	0.05
Pump	100	0.4	0.59	1	1500	20	214	3.417	0.38	4.002	0.45	0.005	0.00	0.465	0.05	0.479	0.05	0.393	0.04
Roller	140	0.2	0.59	1	0	20	0	1.216	0.00	3.132	0.00	0.005	0.00	0.259	0.00	0.267	0.00	0.262	0.00
Scraper	350	0.1	0.59	1	0	20	0	1.287	0.00	3.264	0.00	0.005	0.00	0.169	0.00	0.174	0.00	0.196	0.00
Signal Board	100	0.7	0.43	1	1500	20	214	2.661	0.38	4.861	0.69	0.005	0.00	0.468	0.07	0.483	0.07	0.539	0.08
Street Sweepers	250	0.5	0.59	1	1500	20	214	1.071	0.37	3.339	1.16	0.005	0.00	0.199	0.07	0.205	0.07	0.261	0.09
Trencher	150	0.3	0.59	1	0	20	0	1.370	0.00	3.609	0.00	0.005	0.00	0.279	0.00	0.287	0.00	0.296	0.00
Vibratory Hammer	450	0.3	0.59	1	600	20	86	1.931	0.29	4.272	0.64	0.005	0.00	0.250	0.04	0.258	0.04	0.282	0.04
Water Truck	350	0.4	0.59	1	1500	20	214	0.631	0.25	1.984	0.77	0.004	0.00	0.118	0.05	0.122	0.05	0.171	0.07
Welders	60	0.3	0.59	1	1500	20	214	3.210	0.16	4.191	0.21	0.005	0.00	0.404	0.02	0.416	0.02	0.394	0.02
Tug Boat	2000	0.5	0.59	1	300	20	43	1.520	0.85	4.510	2.51	0.005	0.00	0.200	0.11	0.210	0.12	0.250	0.14
Floating Derrick Crane	600	0.6	0.59	1	300	20	43	1.931	0.39	4.272	0.86	0.005	0.00	0.250	0.05	0.258	0.05	0.282	0.06
<b>Total Emissions by Year</b>								11.85		29.96		0.04							

## West Approach

Equipment Type	2014												2015											
	Working Days in 2014	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2015	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)				
Backhoe	57	6.128	0.05	5.021	0.04	0.006	0.00	0.876	0.01	0.903	0.01	1.067	0.01	57	5.700	0.05	4.645	0.04	0.006	0.00				
Boom Truck	143	0.444	0.10	1.535	0.36	0.004	0.00	0.080	0.02	0.083	0.02	0.158	0.04	143	0.274	0.06	1.135	0.26	0.004	0.00				
Compactor *	19	0.963	0.01	2.973	0.02	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	19	0.862	0.01	2.626	0.02	0.004	0.00				
Compressor	286	1.225	0.34	3.188	0.89	0.005	0.00	0.254	0.07	0.261	0.07	0.273	0.08	286	1.106	0.31	2.827	0.79	0.004	0.00				
Compressor	286	1.225	0.34	3.188	0.89	0.005	0.00	0.254	0.07	0.261	0.07	0.273	0.08	286	1.106	0.31	2.827	0.79	0.004	0.00				
Concrete pump	143	1.739	0.34	3.917	0.76	0.005	0.00	0.226	0.04	0.233	0.05	0.260	0.05	143	1.560	0.30	3.581	0.70	0.005	0.00				
Concrete Saw	19	0.963	0.01	2.973	0.03	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	19	0.862	0.01	2.626	0.03	0.004	0.00				
Cement Mixer	143	1.418	0.81	4.793	2.73	0.005	0.00	0.193	0.11	0.199	0.11	0.331	0.19	143	1.311	0.75	4.475	2.55	0.005	0.00				
Crane	286	0.908	2.66	3.555	10.40	0.005	0.01	0.133	0.39	0.137	0.40	0.213	0.62	286	0.823	2.41	3.213	9.40	0.004	0.01				
Dozer/CAT	19	1.000	0.00	2.408	0.01	0.004	0.00	0.228	0.00	0.235	0.00	0.214	0.00	19	0.867	0.00	2.022	0.01	0.004	0.00				
Drill Rig	76	1.469	0.19	4.815	0.63	0.005	0.00	0.217	0.03	0.224	0.03	0.334	0.04	76	1.358	0.18	4.496	0.58	0.005	0.00				
Dump Truck	48	0.783	0.05	1.955	0.13	0.004	0.00	0.123	0.01	0.127	0.01	0.161	0.01	48	0.637	0.04	1.627	0.11	0.004	0.00				
Excavator	48	0.949	0.03	2.191	0.06	0.004	0.00	0.223	0.01	0.230	0.01	0.197	0.01	48	0.797	0.02	1.824	0.05	0.004	0.00				
Fork Lift	286	0.900	0.67	2.761	2.05	0.004	0.00	0.165	0.12	0.170	0.13	0.231	0.17	286	0.799	0.59	2.421	1.80	0.004	0.00				
Generator Set Gas	286	2.930	0.78	4.023	1.06	0.005	0.00	0.360	0.10	0.371	0.10	0.359	0.09	286	2.663	0.70	3.866	1.02	0.005	0.00				
Generator Set Diesel	286	2.930	1.55	4.023	2.13	0.005	0.00	0.360	0.19	0.371	0.20	0.359	0.19	286	2.663	1.41	3.866	2.05	0.005	0.00				
General Utility Truck	286	0.444	0.23	1.535	0.80	0.004	0.00	0.080	0.04	0.083	0.04	0.158	0.08	286	0.274	0.14	1.135	0.59	0.004	0.00				
Grader	0	0.993	0.00	2.375	0.00	0.004	0.00	0.228	0.00	0.235	0.00	0.212	0.00	0	0.858	0.00	1.990	0.00	0.004	0.00				
Grinder	0	0.963	0.00	2.973	0.00	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	0	0.862	0.00	2.626	0.00	0.004	0.00				
Light Plants	286	2.483	0.47	4.529	0.86	0.005	0.00	0.434	0.08	0.447	0.08	0.500	0.09	286	2.312	0.44	4.208	0.80	0.005	0.00				
Lift	286	3.131	0.93	3.612	1.07	0.005	0.00	0.420	0.12	0.433	0.13	0.357	0.11	286	2.858	0.85	3.240	0.96	0.005	0.00				
Loader	210	2.381	0.24	4.485	0.45	0.005	0.00	0.419	0.04	0.432	0.04	0.672	0.07	210	2.116	0.21	4.099	0.41	0.005	0.00				
Paver	57	1.045	0.01	2.604	0.03	0.004	0.00	0.232	0.00	0.239	0.00	0.230	0.00	57	0.920	0.01	2.232	0.03	0.004	0.00				
Paving Equipment	57	1.204	0.02	3.116	0.04	0.005	0.00	0.250	0.00	0.258	0.00	0.268	0.00	57	1.084	0.01	2.748	0.04	0.004	0.00				
Pickup Truck	286	0.738	0.38	1.748	0.91	0.004	0.00	0.177	0.09	0.182	0.09	0.171	0.09	286	0.519	0.27	1.317	0.69	0.004	0.00				
Pile Driver	114	1.469	0.29	4.815	0.94	0.005	0.00	0.217	0.04	0.224	0.04	0.334	0.07	114	1.358	0.26	4.496	0.88	0.005	0.00				
Pump	286	3.131	0.47	3.612	0.54	0.005	0.00	0.420	0.06	0.433	0.06	0.357	0.05	286	2.858	0.42	3.240	0.48	0.005	0.00				
Roller	0	1.084	0.00	2.740	0.00	0.005	0.00	0.236	0.00	0.243	0.00	0.240	0.00	0	0.961	0.00	2.376	0.00	0.004	0.00				
Scraper	0	1.149	0.00	2.906	0.00	0.004	0.00	0.154	0.00	0.158	0.00	0.187	0.00	0	1.025	0.00	2.577	0.00	0.004	0.00				
Signal Board	286	2.483	0.47	4.529	0.86	0.005	0.00	0.434	0.08	0.447	0.08	0.500	0.09	286	2.312	0.44	4.208	0.80	0.005	0.00				
Street Sweepers	286	0.963	0.45	2.973	1.38	0.004	0.00	0.178	0.08	0.184	0.09	0.244	0.11	286	0.862	0.40	2.626	1.22	0.004	0.00				
Trencher	0	1.241	0.00	3.230	0.00	0.005	0.00	0.255	0.00	0.263	0.00	0.276	0.00											

West Approach

Equipment Type	2015 (cont.)						2016												
	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2016	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.808	0.01	0.833	0.01	0.973	0.01	57	5.288	0.04	4.285	0.03	0.006	0.00	0.741	0.01	0.764	0.01	0.883	0.01
Boom Truck	0.044	0.01	0.046	0.01	0.148	0.03	143	0.203	0.05	0.859	0.20	0.004	0.00	0.029	0.01	0.030	0.01	0.144	0.03
Compactor *	0.159	0.00	0.163	0.00	0.228	0.00	19	0.769	0.01	2.307	0.02	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Compressor	0.231	0.06	0.238	0.07	0.254	0.07	286	0.994	0.28	2.493	0.69	0.004	0.00	0.210	0.06	0.216	0.06	0.236	0.07
Compressor	0.231	0.06	0.238	0.07	0.254	0.07	286	0.994	0.28	2.493	0.69	0.004	0.00	0.210	0.06	0.216	0.06	0.236	0.07
Concrete pump	0.204	0.04	0.210	0.04	0.240	0.05	143	1.419	0.28	3.284	0.64	0.004	0.00	0.186	0.04	0.192	0.04	0.227	0.04
Concrete Saw	0.159	0.00	0.163	0.00	0.228	0.00	19	0.769	0.01	2.307	0.02	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Cement Mixer	0.178	0.10	0.184	0.10	0.311	0.18	143	1.209	0.69	4.171	2.37	0.004	0.00	0.164	0.09	0.169	0.10	0.292	0.17
Crane	0.120	0.35	0.124	0.36	0.203	0.59	286	0.743	2.17	2.888	8.45	0.004	0.01	0.109	0.32	0.112	0.33	0.194	0.57
Dozer/CAT	0.202	0.00	0.208	0.00	0.195	0.00	19	0.738	0.00	1.703	0.01	0.004	0.00	0.171	0.00	0.176	0.00	0.182	0.00
Drill Rig	0.200	0.03	0.206	0.03	0.314	0.04	76	1.253	0.16	4.190	0.54	0.004	0.00	0.185	0.02	0.190	0.02	0.295	0.04
Dump Truck	0.099	0.01	0.103	0.01	0.156	0.01	48	0.499	0.03	1.330	0.09	0.004	0.00	0.076	0.00	0.079	0.01	0.151	0.01
Excavator	0.187	0.01	0.193	0.01	0.183	0.01	48	0.650	0.02	1.492	0.04	0.004	0.00	0.150	0.00	0.155	0.00	0.171	0.00
Fork Lift	0.147	0.11	0.152	0.11	0.215	0.16	286	0.705	0.52	2.111	1.57	0.004	0.00	0.131	0.10	0.135	0.10	0.200	0.15
Generator Set Gas	0.318	0.08	0.328	0.09	0.326	0.09	286	2.408	0.64	3.719	0.98	0.005	0.00	0.278	0.07	0.286	0.08	0.295	0.08
Generator Set Diesel	0.318	0.17	0.328	0.17	0.326	0.17	286	2.408	1.27	3.719	1.97	0.005	0.00	0.278	0.15	0.286	0.15	0.295	0.16
General Utility Truck	0.044	0.02	0.046	0.02	0.148	0.08	286	0.203	0.11	0.859	0.45	0.004	0.00	0.029	0.02	0.030	0.02	0.144	0.07
Grader	0.201	0.00	0.207	0.00	0.193	0.00	0	0.726	0.00	1.669	0.00	0.004	0.00	0.168	0.00	0.174	0.00	0.180	0.00
Grinder	0.159	0.00	0.163	0.00	0.228	0.00	0	0.769	0.00	2.307	0.00	0.004	0.00	0.141	0.00	0.145	0.00	0.214	0.00
Light Plants	0.400	0.08	0.413	0.08	0.463	0.09	286	2.148	0.41	3.899	0.74	0.005	0.00	0.368	0.07	0.379	0.07	0.428	0.08
Lift	0.376	0.11	0.388	0.12	0.325	0.10	286	2.596	0.77	2.885	0.86	0.005	0.00	0.334	0.10	0.344	0.10	0.294	0.09
Loader	0.383	0.04	0.394	0.04	0.613	0.06	210	1.930	0.19	3.763	0.38	0.005	0.00	0.352	0.04	0.362	0.04	0.567	0.06
Paver	0.209	0.00	0.215	0.00	0.210	0.00	57	0.803	0.01	1.892	0.02	0.004	0.00	0.185	0.00	0.191	0.00	0.192	0.00
Paving Equipment	0.227	0.00	0.234	0.00	0.249	0.00	57	0.971	0.01	2.426	0.03	0.004	0.00	0.207	0.00	0.213	0.00	0.231	0.00
Pickup Truck	0.118	0.06	0.122	0.06	0.158	0.08	286	0.322	0.17	0.933	0.49	0.004	0.00	0.063	0.03	0.065	0.03	0.148	0.08
Pile Driver	0.200	0.04	0.206	0.04	0.314	0.06	114	1.253	0.24	4.190	0.82	0.004	0.00	0.185	0.04	0.190	0.04	0.295	0.06
Pump	0.376	0.06	0.388	0.06	0.325	0.05	286	2.596	0.39	2.885	0.43	0.005	0.00	0.334	0.05	0.344	0.05	0.294	0.04
Roller	0.213	0.00	0.220	0.00	0.221	0.00	0	0.845	0.00	2.041	0.00	0.004	0.00	0.191	0.00	0.197	0.00	0.203	0.00
Scraper	0.140	0.00	0.144	0.00	0.179	0.00	0	0.911	0.00	2.271	0.00	0.004	0.00	0.127	0.00	0.131	0.00	0.172	0.00
Signal Board	0.400	0.08	0.413	0.08	0.463	0.09	286	2.148	0.41	3.899	0.74	0.005	0.00	0.368	0.07	0.379	0.07	0.428	0.08
Street Sweepers	0.159	0.07	0.163	0.08	0.228	0.11	286	0.769	0.36	2.307	1.07	0.004	0.00	0.141	0.07	0.145	0.07	0.214	0.10
Trencher	0.233	0.00	0.240	0.00	0.257	0.00	0	1.011	0.00	2.537	0.00	0.004	0.00	0.212	0.00	0.218	0.00	0.240	0.00
Vibratory Hammer	0.204	0.04	0.210	0.04	0.240	0.05	114	1.419	0.28	3.284	0.66	0.004	0.00	0.186	0.04	0.192	0.04	0.227	0.05
Water Truck	0.044	0.02	0.046	0.02	0.148	0.08	286	0.203	0.11	0.859	0.45	0.004	0.00	0.029	0.02	0.030	0.02	0.144	0.07
Welders	0.318	0.02	0.328	0.02	0.326	0.02	286	2.408	0.16	3.719	0.25	0.005	0.00	0.278	0.02	0.286	0.02	0.295	0.02
Tug Boat	0.200	0.15	0.210																

## West Approach

Equipment Type	2017												2018											
	Working Days in 2017	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2018	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)			
Backhoe	57	4.895	0.04	3.940	0.03	0.006	0.00	0.678	0.01	0.699	0.01	0.799	0.01	29	4.557	0.02	3.625	0.01	0.006	0.00	0.623			
Boom Truck	143	0.163	0.04	0.633	0.15	0.004	0.00	0.021	0.00	0.021	0.00	0.142	0.03	71	0.139	0.02	0.446	0.05	0.004	0.00	0.015			
Compactor *	19	0.682	0.00	2.026	0.01	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	10	0.600	0.00	1.767	0.01	0.004	0.00	0.111			
Compressor	286	0.890	0.25	2.197	0.61	0.004	0.00	0.190	0.05	0.196	0.05	0.220	0.06	143	0.791	0.11	1.922	0.27	0.004	0.00	0.172			
Compressor	286	0.890	0.25	2.197	0.61	0.004	0.00	0.190	0.05	0.196	0.05	0.220	0.06	143	0.791	0.11	1.922	0.27	0.004	0.00	0.172			
Concrete pump	143	1.290	0.25	3.003	0.59	0.004	0.00	0.170	0.03	0.176	0.03	0.215	0.04	71	1.171	0.11	2.737	0.27	0.004	0.00	0.155			
Concrete Saw	19	0.682	0.01	2.026	0.02	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	10	0.600	0.00	1.767	0.01	0.004	0.00	0.111			
Cement Mixer	143	1.112	0.63	3.877	2.21	0.004	0.00	0.150	0.09	0.155	0.09	0.275	0.16	71	1.019	0.29	3.594	1.02	0.004	0.00	0.137			
Crane	286	0.668	1.95	2.583	7.56	0.004	0.01	0.098	0.29	0.101	0.30	0.186	0.54	143	0.602	0.88	2.313	3.38	0.004	0.01	0.089			
Dozer/CAT	19	0.612	0.00	1.411	0.01	0.004	0.00	0.139	0.00	0.143	0.00	0.171	0.00	10	0.492	0.00	1.155	0.00	0.004	0.00	0.108			
Drill Rig	76	1.152	0.15	3.895	0.51	0.004	0.00	0.170	0.02	0.175	0.02	0.277	0.04	38	1.056	0.07	3.611	0.23	0.004	0.00	0.155			
Dump Truck	48	0.372	0.02	1.060	0.07	0.004	0.00	0.054	0.00	0.055	0.00	0.147	0.01	24	0.266	0.01	0.825	0.03	0.004	0.00	0.034			
Excavator	48	0.510	0.01	1.201	0.03	0.004	0.00	0.113	0.00	0.117	0.00	0.161	0.00	24	0.380	0.01	0.940	0.01	0.004	0.00	0.078			
Fork Lift	286	0.617	0.46	1.826	1.36	0.004	0.00	0.116	0.09	0.120	0.09	0.187	0.14	143	0.535	0.20	1.582	0.59	0.004	0.00	0.100			
Generator Set Gas	286	2.163	0.57	3.585	0.95	0.005	0.00	0.241	0.06	0.248	0.07	0.268	0.07	143	1.930	0.26	3.473	0.46	0.005	0.00	0.211			
Generator Set Diesel	286	2.163	1.14	3.585	1.90	0.005	0.00	0.241	0.13	0.248	0.13	0.268	0.14	143	1.930	0.51	3.473	0.92	0.005	0.00	0.211			
General Utility Truck	286	0.163	0.08	0.633	0.33	0.004	0.00	0.021	0.01	0.021	0.01	0.142	0.07	143	0.139	0.04	0.446	0.12	0.004	0.00	0.015			
Grader	0	0.598	0.00	1.378	0.00	0.004	0.00	0.136	0.00	0.140	0.00	0.169	0.00	0	0.477	0.00	1.122	0.00	0.004	0.00	0.104			
Grinder	0	0.682	0.00	2.026	0.00	0.004	0.00	0.126	0.00	0.129	0.00	0.200	0.00	0	0.600	0.00	1.767	0.00	0.004	0.00	0.111			
Light Plants	286	1.990	0.38	3.602	0.68	0.005	0.00	0.336	0.06	0.346	0.07	0.394	0.07	143	1.841	0.17	3.319	0.31	0.005	0.00	0.306			
Lift	286	2.344	0.70	2.551	0.76	0.005	0.00	0.295	0.09	0.304	0.09	0.267	0.08	143	2.103	0.31	2.246	0.33	0.005	0.00	0.263			
Loader	210	1.765	0.18	3.447	0.35	0.005	0.00	0.322	0.03	0.332	0.03	0.524	0.05	105	1.615	0.08	3.146	0.16	0.005	0.00	0.294			
Paver	57	0.690	0.01	1.607	0.02	0.004	0.00	0.158	0.00	0.163	0.00	0.181	0.00	29	0.581	0.00	1.349	0.01	0.004	0.00	0.130			
Paving Equipment	57	0.866	0.01	2.127	0.03	0.004	0.00	0.187	0.00	0.193	0.00	0.215	0.00	29	0.767	0.00	1.851	0.01	0.004	0.00	0.169			
Pickup Truck	286	0.239	0.12	0.675	0.35	0.004	0.00	0.039	0.02	0.040	0.02	0.144	0.07	143	0.192	0.05	0.472	0.12	0.004	0.00	0.026			
Pile Driver	114	1.152	0.22	3.895	0.76	0.004	0.00	0.170	0.03	0.175	0.03	0.277	0.05	57	1.056	0.10	3.611	0.35	0.004	0.00	0.155			
Pump	286	2.344	0.35	2.551	0.38	0.005	0.00	0.295	0.04	0.304	0.05	0.267	0.04	143	2.103	0.16	2.246	0.17	0.005	0.00	0.263			
Roller	0	0.738	0.00	1.735	0.00	0.004	0.00	0.169	0.00	0.174	0.00	0.187	0.00	0	0.635	0.00	1.481	0.00	0.004	0.00	0.144			
Scraper	0	0.805	0.00	1.986	0.00	0.004	0.00	0.114	0.00	0.118	0.00	0.166	0.00	0	0.705	0.00	1.720	0.00	0.004	0.00	0.102			
Signal Board	286	1.990	0.38	3.602	0.68	0.005	0.00	0.336	0.06	0.346	0.07	0.394	0.07	143	1.841	0.17	3.319	0.31	0.005	0.00	0.306			
Street Sweepers	286	0.682	0.32	2.026	0.94	0.004	0.00	0.126	0.06	0.129	0.06	0.200	0.09	143	0.600	0.14	1.767	0.41	0.004	0.00	0.111			
Trencher	0	0.907	0.00	2.242	0.00	0.004	0.00	0.193	0.00	0.199	0.00	0.223	0.00	0	0.809	0.00	1.968	0.00</td						

## West Approach

Equipment Type	2018 (cont.)				
	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.00	0.642	0.00	0.731	0.00
Boom Truck	0.00	0.016	0.00	0.140	0.02
Compactor *	0.00	0.115	0.00	0.187	0.00
Compressor	0.02	0.177	0.02	0.205	0.03
Compressor	0.02	0.177	0.02	0.205	0.03
Concrete pump	0.02	0.160	0.02	0.206	0.02
Concrete Saw	0.00	0.115	0.00	0.187	0.00
Cement Mixer	0.04	0.141	0.04	0.258	0.07
Crane	0.13	0.091	0.13	0.179	0.26
Dozer/CAT	0.00	0.111	0.00	0.162	0.00
Drill Rig	0.01	0.160	0.01	0.260	0.02
Dump Truck	0.00	0.035	0.00	0.143	0.00
Excavator	0.00	0.080	0.00	0.153	0.00
Fork Lift	0.04	0.103	0.04	0.177	0.07
Generator Set Gas	0.03	0.217	0.03	0.244	0.03
Generator Set Diesel	0.06	0.217	0.06	0.244	0.06
General Utility Truck	0.00	0.016	0.00	0.140	0.04
Grader	0.00	0.107	0.00	0.161	0.00
Grinder	0.00	0.115	0.00	0.187	0.00
Light Plants	0.03	0.315	0.03	0.363	0.03
Lift	0.04	0.271	0.04	0.243	0.04
Loader	0.01	0.303	0.02	0.485	0.02
Paver	0.00	0.134	0.00	0.171	0.00
Paving Equipment	0.00	0.174	0.00	0.200	0.00
Pickup Truck	0.01	0.027	0.01	0.142	0.04
Pile Driver	0.02	0.160	0.02	0.260	0.03
Pump	0.02	0.271	0.02	0.243	0.02
Roller	0.00	0.148	0.00	0.177	0.00
Scraper	0.00	0.105	0.00	0.161	0.00
Signal Board	0.03	0.315	0.03	0.363	0.03
Street Sweepers	0.03	0.115	0.03	0.187	0.04
Trencher	0.00	0.180	0.00	0.208	0.00
Vibratory Hammer	0.02	0.160	0.02	0.206	0.02
Water Truck	0.00	0.016	0.00	0.140	0.04
Welders	0.01	0.217	0.01	0.244	0.01
Tug Boat	0.07	0.210	0.08	0.250	0.09
Floating Derrick Crane	0.02	0.160	0.02	0.206	0.03
<b>Total Emissions by Year</b>	<b>0.68</b>		<b>0.70</b>		<b>1.10</b>



Evergreen Point Bridge and Eastside Transition Area

Equipment Type	Horsepower (hp)	Utilization Factor (%)	Load	# of Equipment	Floating Bridge		East Approach		Segment Total		2012								
					Working Days	Hours per Day	Working Days	Hours per Day	Total Working Days	Hours per Day	Working Days in 2012	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)
Backhoe	100	0.3	0.21	1	300	20	300	20	600	20	171	6.569	0.16	5.413	0.13	0.006	0.00	0.945	0.02
Boom Truck	250	0.5	0.59	1	720	20	400	20	1120	20	320	0.631	0.33	1.984	1.03	0.004	0.00	0.118	0.06
Compactor *	200	0.2	0.43	1	50	20	100	20	150	20	43	1.071	0.02	3.339	0.05	0.005	0.00	0.199	0.00
Compressor	150	0.5	0.59	1	720	20	675	20	1395	20	399	1.353	0.53	3.569	1.39	0.005	0.00	0.277	0.11
Compressor	150	0.5	0.59	1	720	20	675	20	1395	20	399	1.353	0.53	3.569	1.39	0.005	0.00	0.277	0.11
Concrete pump	350	0.3	0.59	1	600	20	350	20	950	20	271	1.931	0.72	4.272	1.58	0.005	0.00	0.250	0.09
Concrete Saw	200	0.2	0.59	1	50	20	100	20	150	20	43	1.353	0.03	3.569	0.08	0.005	0.00	0.277	0.01
Cement Mixer	350	0.3	0.43	4	600	20	350	20	950	20	271	1.530	1.65	5.124	5.54	0.005	0.01	0.210	0.23
Crane	600	0.6	0.43	1	720	20	675	20	1395	20	399	0.999	1.36	3.917	5.33	0.005	0.01	0.147	0.20
Dozer/CAT	150	0.1	0.59	1	50	20	200	20	250	20	71	1.136	0.02	2.826	0.04	0.005	0.00	0.254	0.00
Drill Rig	600	0.3	0.43	1	200	20	300	20	500	20	143	1.585	0.39	5.147	1.25	0.005	0.00	0.234	0.06
Dump Truck	350	0.3	0.59	1	200	20	300	20	500	20	143	0.940	0.18	2.328	0.45	0.004	0.00	0.146	0.03
Excavator	150	0.3	0.59	1	200	20	400	20	600	20	171	1.103	0.11	2.636	0.26	0.005	0.00	0.253	0.03
Fork Lift	200	0.5	0.59	2	720	20	675	20	1395	20	399	1.009	1.05	3.145	3.26	0.005	0.00	0.186	0.19
Generator Set Gas	60	0.7	1.00	1	720	20	675	20	1395	20	399	3.210	1.18	4.191	1.55	0.005	0.00	0.404	0.15
Generator Set Diesel	60	0.7	1.00	2	720	20	675	20	1395	20	399	3.210	2.37	4.191	3.09	0.005	0.00	0.404	0.30
General Utility Truck	200	0.7	0.59	1	720	20	675	20	1395	20	399	0.631	0.46	1.984	1.44	0.004	0.00	0.118	0.09
Grader	150	0.2	0.59	1	0	20	50	20	50	20	14	1.132	0.01	2.797	0.02	0.005	0.00	0.254	0.00
Grinder	300	0.1	0.59	1	0	20	50	20	50	20	14	1.071	0.01	3.339	0.02	0.005	0.00	0.199	0.00
Light Plants	100	0.7	0.43	1	720	20	675	20	1395	20	399	2.661	0.70	4.861	1.29	0.005	0.00	0.468	0.12
Lift	100	0.8	0.59	1	720	20	675	20	1395	20	399	3.417	1.42	4.002	1.66	0.005	0.00	0.465	0.19
Loader	260	0.4	0.21	1	300	20	200	20	500	20	143	2.669	0.18	4.892	0.34	0.005	0.00	0.458	0.03
Paver	175	0.1	0.59	1	0	20	100	20	100	20	29	1.179	0.01	3.008	0.02	0.005	0.00	0.256	0.00
Paving Equipment	175	0.1	0.59	1	0	20	100	20	100	20	29	1.333	0.01	3.505	0.02	0.005	0.00	0.274	0.00
Pickup Truck	175	0.8	0.59	1	720	20	675	20	1395	20	399	0.967	0.70	2.227	1.62	0.004	0.00	0.234	0.17
Pile Driver	600	0.3	0.43	1	100	20	200	20	300	20	86	1.585	0.23	5.147	0.75	0.005	0.00	0.234	0.03
Pump	100	0.4	0.59	1	720	20	675	20	1395	20	399	3.417	0.71	4.002	0.83	0.005	0.00	0.465	0.10
Roller	140	0.2	0.59	1	100	20	50	20	150	20	43	1.216	0.02	3.132	0.05	0.005	0.00	0.259	0.00
Scraper	350	0.1	0.59	1	0	20	0	20	0	20	0	1.287	0.00	3.264	0.00	0.005	0.00	0.169	0.00
Signal Board	100	0.7	0.43	1	720	20	675	20	1395	20	399	2.661	0.70	4.861	1.29	0.005	0.00	0.468	0.12
Street Sweepers	250	0.5	0.59	1	720	20	675	20	1395	20	399	1.071	0.69	3.339	2.16	0.005	0.00	0.199	0.13
Trencher	150	0.3	0.59	1	0	20	0	20	0	20	0	1.370	0.00	3.609	0.00	0.005	0.00	0.279	0.00
Vibratory Hammer	450	0.3	0.59	1	100	20	200	20	300	20	86	1.931	0.29	4.272	0.64	0.005	0.00	0.250	0.04
Water Truck	350	0.4	0.59	1	400	20	675	20	1075	20	307	0.631	0.35	1.984	1.11	0.004	0.00	0.118	0.07
Welders	60	0.3	0.59	1	720	20	675	20	1395	20	399	3.210	0.30	4.191	0.39	0.005	0.00	0.404	0.04
Tug Boat	2000	0.5	0.59	4	600	20	100	20	700	20	200	1.520	15.82	4.510	46.93	0.005	0.05	0.200	2.08
Floating Derrick Crane	600	0.6	0.59	4	600	20	100	20	700	20	200	1.931	7.23	4.272	16.00	0.005	0.02	0.250	0.94
<b>Total Emissions by Year</b>												40.45	103.01		0.12		5.74		

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Evergreen Point Bridge and Eastside Transition Area

Equipment Type	2012 (cont.)				2013												
	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2013	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.974	0.02	1.165	0.03	171	6.569	0.16	5.413	0.13	0.006	0.00	0.945	0.02	0.974	0.02	1.165	0.03
Boom Truck	0.122	0.06	0.171	0.09	320	0.631	0.33	1.984	1.03	0.004	0.00	0.118	0.06	0.122	0.06	0.171	0.09
Compactor *	0.205	0.00	0.261	0.00	43	1.071	0.02	3.339	0.05	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Compressor	0.285	0.11	0.293	0.11	399	1.353	0.53	3.569	1.39	0.005	0.00	0.277	0.11	0.285	0.11	0.293	0.11
Compressor	0.285	0.11	0.293	0.11	399	1.353	0.53	3.569	1.39	0.005	0.00	0.277	0.11	0.285	0.11	0.293	0.11
Concrete pump	0.258	0.10	0.282	0.10	271	1.931	0.72	4.272	1.58	0.005	0.00	0.250	0.09	0.258	0.10	0.282	0.10
Concrete Saw	0.285	0.01	0.293	0.01	43	1.353	0.03	3.569	0.08	0.005	0.00	0.277	0.01	0.285	0.01	0.293	0.01
Cement Mixer	0.216	0.23	0.351	0.38	271	1.530	1.65	5.124	5.54	0.005	0.01	0.210	0.23	0.216	0.23	0.351	0.38
Crane	0.151	0.21	0.225	0.31	399	0.999	1.36	3.917	5.33	0.005	0.01	0.147	0.20	0.151	0.21	0.225	0.31
Dozer/CAT	0.261	0.00	0.236	0.00	71	1.136	0.02	2.826	0.04	0.005	0.00	0.254	0.00	0.261	0.00	0.236	0.00
Drill Rig	0.242	0.06	0.355	0.09	143	1.585	0.39	5.147	1.25	0.005	0.00	0.234	0.06	0.242	0.06	0.355	0.09
Dump Truck	0.150	0.03	0.166	0.03	143	0.940	0.18	2.328	0.45	0.004	0.00	0.146	0.03	0.150	0.03	0.166	0.03
Excavator	0.261	0.03	0.220	0.02	171	1.103	0.11	2.636	0.26	0.005	0.00	0.253	0.03	0.261	0.03	0.220	0.02
Fork Lift	0.192	0.20	0.248	0.26	399	1.009	1.05	3.145	3.26	0.005	0.00	0.186	0.19	0.192	0.20	0.248	0.26
Generator Set Gas	0.416	0.15	0.394	0.15	399	3.210	1.18	4.191	1.55	0.005	0.00	0.404	0.15	0.416	0.15	0.394	0.15
Generator Set Diesel	0.416	0.31	0.394	0.29	399	3.210	2.37	4.191	3.09	0.005	0.00	0.404	0.30	0.416	0.31	0.394	0.29
General Utility Truck	0.122	0.09	0.171	0.12	399	0.631	0.46	1.984	1.44	0.004	0.00	0.118	0.09	0.122	0.09	0.171	0.12
Grader	0.261	0.00	0.234	0.00	14	1.132	0.01	2.797	0.02	0.005	0.00	0.254	0.00	0.261	0.00	0.234	0.00
Grinder	0.205	0.00	0.261	0.00	14	1.071	0.01	3.339	0.02	0.005	0.00	0.199	0.00	0.205	0.00	0.261	0.00
Light Plants	0.483	0.13	0.539	0.14	399	2.661	0.70	4.861	1.29	0.005	0.00	0.468	0.12	0.483	0.13	0.539	0.14
Lift	0.479	0.20	0.393	0.16	399	3.417	1.42	4.002	1.66	0.005	0.00	0.465	0.19	0.479	0.20	0.393	0.16
Loader	0.472	0.03	0.736	0.05	143	2.669	0.18	4.892	0.34	0.005	0.00	0.458	0.03	0.472	0.03	0.736	0.05
Paver	0.264	0.00	0.251	0.00	29	1.179	0.01	3.008	0.02	0.005	0.00	0.256	0.00	0.264	0.00	0.251	0.00
Paving Equipment	0.282	0.00	0.288	0.00	29	1.333	0.01	3.505	0.02	0.005	0.00	0.274	0.00	0.282	0.00	0.288	0.00
Pickup Truck	0.241	0.18	0.187	0.14	399	0.967	0.70	2.227	1.62	0.004	0.00	0.234	0.17	0.241	0.18	0.187	0.14
Pile Driver	0.242	0.04	0.355	0.05	86	1.585	0.23	5.147	0.75	0.005	0.00	0.234	0.03	0.242	0.04	0.355	0.05
Pump	0.479	0.10	0.393	0.08	399	3.417	0.71	4.002	0.83	0.005	0.00	0.465	0.10	0.479	0.10	0.393	0.08
Roller	0.267	0.00	0.262	0.00	43	1.216	0.02	3.132	0.05	0.005	0.00	0.259	0.00	0.267	0.00	0.262	0.00
Scraper	0.174	0.00	0.196	0.00	0	1.287	0.00	3.264	0.00	0.005	0.00	0.169	0.00	0.174	0.00	0.196	0.00
Signal Board	0.483	0.13	0.539	0.14	399	2.661	0.70	4.861	1.29	0.005	0.00	0.468	0.12	0.483	0.13	0.539	0.14
Street Sweepers	0.205	0.13	0.261	0.17	399	1.071	0.69	3.339	2.16	0.005	0.00	0.199	0.13	0.205	0.13	0.261	0.17
Trencher	0.287	0.00	0.296	0.00	0	1.370	0.00	3.609	0.00	0.005	0.00	0.279	0.00	0.287	0.00	0.296	0.00
Vibratory Hammer	0.258	0.04	0.282	0.04	86	1.931	0.29	4.272	0.64	0.005	0.00	0.250	0.04	0.258	0.04	0.282	0.04
Water Truck	0.122	0.07	0.171	0.10	307	0.631	0.35	1.984	1.11	0.004	0.00	0.118	0.07	0.122	0.07	0.171	0.10
Welders	0.416	0.04	0.394	0.04	399	3.210	0.30	4.191	0.39	0.005	0.00	0.404	0.04	0.416	0.04	0.394	0.04
Tug Boat	0.210	2.19	0.250	2.60	200	1.520	15.82	4.510	46.93	0.005	0.05	0.200	2.08	0.210	2.19	0.250	2.60
Floating Derrick Crane	0.258	0.97	0.282	1.06	200	1.931	7.23	4.272	16.00	0.005	0.02	0.250	0.94	0.258	0.97	0.282	1.06
<b>Total Emissions by Year</b>		<b>5.96</b>		<b>6.89</b>			<b>40.45</b>		<b>103.01</b>		<b>0.12</b>		<b>5.74</b>		<b>5.96</b>		<b>6.89</b>

Evergreen Point Bridge and Eastside Transition Area

Equipment Type	2014												2015							
	Working Days in 2014	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)	Working Days in 2015	CO Emission Factor (g/hp-hr)	CO Emissions (ton/yr)	NOx Emission Factor (g/hp-hr)	NOx Emissions (ton/yr)	SO2 Emission Factor (g/hp-hr)	SO2 Emissions (ton/yr)
Backhoe	171	6.128	0.15	5.021	0.12	0.006	0.00	0.876	0.02	0.903	0.02	1.067	0.03	86	5.700	0.07	4.645	0.06	0.006	0.00
Boom Truck	320	0.444	0.23	1.535	0.80	0.004	0.00	0.080	0.04	0.083	0.04	0.158	0.08	160	0.274	0.07	1.135	0.30	0.004	0.00
Compactor *	43	0.963	0.02	2.973	0.05	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	21	0.862	0.01	2.626	0.02	0.004	0.00
Compressor	399	1.225	0.48	3.188	1.24	0.005	0.00	0.254	0.10	0.261	0.10	0.273	0.11	199	1.106	0.22	2.827	0.55	0.004	0.00
Compressor	399	1.225	0.48	3.188	1.24	0.005	0.00	0.254	0.10	0.261	0.10	0.273	0.11	199	1.106	0.22	2.827	0.55	0.004	0.00
Concrete pump	271	1.739	0.64	3.917	1.45	0.005	0.00	0.226	0.08	0.233	0.09	0.260	0.10	136	1.560	0.29	3.581	0.66	0.005	0.00
Concrete Saw	43	0.963	0.02	2.973	0.07	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.01	21	0.862	0.01	2.626	0.03	0.004	0.00
Cement Mixer	271	1.418	1.53	4.793	5.18	0.005	0.00	0.193	0.21	0.199	0.22	0.331	0.36	136	1.311	0.71	4.475	2.42	0.005	0.00
Crane	399	0.908	1.24	3.555	4.84	0.005	0.01	0.133	0.18	0.137	0.19	0.213	0.29	199	0.823	0.56	3.213	2.18	0.004	0.00
Dozer/CAT	71	1.000	0.01	2.408	0.03	0.004	0.00	0.228	0.00	0.235	0.00	0.214	0.00	36	0.867	0.01	2.022	0.01	0.004	0.00
Drill Rig	143	1.469	0.36	4.815	1.17	0.005	0.00	0.217	0.05	0.224	0.05	0.334	0.08	71	1.358	0.17	4.496	0.55	0.005	0.00
Dump Truck	143	0.783	0.15	1.955	0.38	0.004	0.00	0.123	0.02	0.127	0.02	0.161	0.03	71	0.637	0.06	1.627	0.16	0.004	0.00
Excavator	171	0.949	0.10	2.191	0.22	0.004	0.00	0.223	0.02	0.230	0.02	0.197	0.02	86	0.797	0.04	1.824	0.09	0.004	0.00
Fork Lift	399	0.900	0.93	2.761	2.86	0.004	0.00	0.165	0.17	0.170	0.18	0.231	0.24	199	0.799	0.41	2.421	1.26	0.004	0.00
Generator Set Gas	399	2.930	1.08	4.023	1.48	0.005	0.00	0.360	0.13	0.371	0.14	0.359	0.13	199	2.663	0.49	3.866	0.71	0.005	0.00
Generator Set Diesel	399	2.930	2.16	4.023	2.97	0.005	0.00	0.360	0.27	0.371	0.27	0.359	0.26	199	2.663	0.98	3.866	1.43	0.005	0.00
General Utility Truck	399	0.444	0.32	1.535	1.11	0.004	0.00	0.080	0.06	0.083	0.06	0.158	0.12	199	0.274	0.10	1.135	0.41	0.004	0.00
Grader	14	0.993	0.01	2.375	0.01	0.004	0.00	0.228	0.00	0.235	0.00	0.212	0.00	7	0.858	0.00	1.990	0.01	0.004	0.00
Grinder	14	0.963	0.01	2.973	0.02	0.004	0.00	0.178	0.00	0.184	0.00	0.244	0.00	7	0.862	0.00	2.626	0.01	0.004	0.00
Light Plants	399	2.483	0.66	4.529	1.20	0.005	0.00	0.434	0.11	0.447	0.12	0.500	0.13	199	2.312	0.31	4.208	0.56	0.005	0.00
Lift	399	3.131	1.30	3.612	1.50	0.005	0.00	0.420	0.17	0.433	0.18	0.357	0.15	199	2.858	0.59	3.240	0.67	0.005	0.00
Loader	143	2.381	0.16	4.485	0.31	0.005	0.00	0.419	0.03	0.432	0.03	0.672	0.05	71	2.116	0.07	4.099	0.14	0.005	0.00
Paver	29	1.045	0.01	2.604	0.02	0.004	0.00	0.232	0.00	0.239	0.00	0.230	0.00	14	0.920	0.00	2.232	0.01	0.004	0.00
Paving Equipment	29	1.204	0.01	3.116	0.02	0.005	0.00	0.250	0.00	0.258	0.00	0.268	0.00	14	1.084	0.00	2.748	0.01	0.004	0.00
Pickup Truck	399	0.738	0.54	1.748	1.27	0.004	0.00	0.177	0.13	0.182	0.13	0.171	0.12	199	0.519	0.19	1.317	0.48	0.004	0.00
Pile Driver	86	1.469	0.21	4.815	0.70	0.005	0.00	0.217	0.03	0.224	0.03	0.334	0.05	43	1.358	0.10	4.496	0.33	0.005	0.00
Pump	399	3.131	0.65	3.612	0.75	0.005	0.00	0.420	0.09	0.433	0.09	0.357	0.07	199	2.858	0.30	3.240	0.34	0.005	0.00
Roller	43	1.084	0.02	2.740	0.04	0.005	0.00	0.236	0.00	0.243	0.00	0.240	0.00	21	0.961	0.01	2.376	0.02	0.004	0.00
Scraper	0	1.149	0.00	2.906	0.00	0.004	0.00	0.154	0.00	0.158	0.00	0.187	0.00	0	1.025	0.00	2.577	0.00	0.004	0.00
Signal Board	399	2.483	0.66	4.529	1.20	0.005	0.00	0.434	0.11	0.447	0.12	0.500	0.13	199	2.312	0.31	4.208	0.56	0.005	0.00
Street Sweepers	399	0.963	0.62	2.973	1.93	0.004	0.00	0.178	0.12	0.184	0.12	0.244	0.16	199	0.862	0.28	2.626	0.85	0.004	0.00
Trencher	0	1.241	0.00	3.230	0.00	0.005	0.00	0.255	0.00	0.263	0.00	0.276	0.00	0	1.122	0.00	2.872	0.00	0.004	0.00
Vibratory Hammer	86	1.739	0.26	3.917	0.59	0.005	0.00	0.226	0.03	0.233	0.04	0.260	0.04	43	1.560	0.12	3.581	0.27	0.005	0.00
Water Truck	307	0.444	0.25	1.535	0.86	0.004	0.00	0.080	0.04	0.083	0.05	0.158	0.09	154	0.274</td					

Evergreen Point Bridge and Eastside Transition Area

Equipment Type	2015 (cont.)					
	PM2.5 Emission Factor (g/hp-hr)	PM2.5 Emissions (ton/yr)	PM10 Emission Factor (g/hp-hr)	PM10 Emissions (ton/yr)	VOC Emission Factor (g/hp-hr)	VOC Emissions (ton/yr)
Backhoe	0.808	0.01	0.833	0.01	0.973	0.01
Boom Truck	0.044	0.01	0.046	0.01	0.148	0.04
Compactor *	0.159	0.00	0.163	0.00	0.228	0.00
Compressor	0.231	0.04	0.238	0.05	0.254	0.05
Compressor	0.231	0.04	0.238	0.05	0.254	0.05
Concrete pump	0.204	0.04	0.210	0.04	0.240	0.04
Concrete Saw	0.159	0.00	0.163	0.00	0.228	0.00
Cement Mixer	0.178	0.10	0.184	0.10	0.311	0.17
Crane	0.120	0.08	0.124	0.08	0.203	0.14
Dozer/CAT	0.202	0.00	0.208	0.00	0.195	0.00
Drill Rig	0.200	0.02	0.206	0.03	0.314	0.04
Dump Truck	0.099	0.01	0.103	0.01	0.156	0.02
Excavator	0.187	0.01	0.193	0.01	0.183	0.01
Fork Lift	0.147	0.08	0.152	0.08	0.215	0.11
Generator Set Gas	0.318	0.06	0.328	0.06	0.326	0.06
Generator Set Diesel	0.318	0.12	0.328	0.12	0.326	0.12
General Utility Truck	0.044	0.02	0.046	0.02	0.148	0.05
Grader	0.201	0.00	0.207	0.00	0.193	0.00
Grinder	0.159	0.00	0.163	0.00	0.228	0.00
Light Plants	0.400	0.05	0.413	0.05	0.463	0.06
Lift	0.376	0.08	0.388	0.08	0.325	0.07
Loader	0.383	0.01	0.394	0.01	0.613	0.02
Paver	0.209	0.00	0.215	0.00	0.210	0.00
Paving Equipment	0.227	0.00	0.234	0.00	0.249	0.00
Pickup Truck	0.118	0.04	0.122	0.04	0.158	0.06
Pile Driver	0.200	0.01	0.206	0.02	0.314	0.02
Pump	0.376	0.04	0.388	0.04	0.325	0.03
Roller	0.213	0.00	0.220	0.00	0.221	0.00
Scraper	0.140	0.00	0.144	0.00	0.179	0.00
Signal Board	0.400	0.05	0.413	0.05	0.463	0.06
Street Sweepers	0.159	0.05	0.163	0.05	0.228	0.07
Trencher	0.233	0.00	0.240	0.00	0.257	0.00
Vibratory Hammer	0.204	0.02	0.210	0.02	0.240	0.02
Water Truck	0.044	0.01	0.046	0.01	0.148	0.04
Welders	0.318	0.01	0.328	0.02	0.326	0.02
Tug Boat	0.200	1.04	0.210	1.09	0.250	1.30
Floating Derrick Crane	0.204	0.38	0.210	0.39	0.240	0.45
<b>Total Emissions by Year</b>		2.46		2.55		3.14